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Director and Curator.

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CORRIGENDA.

- Page 49, line 7—for “ Monseptate ” read “ Nonseptate.”
- „ 304, „ 33—for “ *Buchannania* ” read “ *Buchanania*.”
- „ 306, „ 23—for “ *Buchannania* ” read “ *Buchanania*.”
- „ 316, „ 46—for “ Martyn ” read “ von Martens.”
- „ 345, footnote 36—for “ Raymond’s ” read “ Stephens and Stokes.”
- „ 355, „ 64—before 1835 and 1836 insert “ Stephens and Stokes.”
- „ 355, „ 65—before 1837 insert “ Stephens and Stokes.”
- „ 364, line 4—for “ William John Macleay, Esq.” read “ William Sharp
Macleay, Esq.”
- „ 399, „ 15—for “ Mr. Fisher ” read “ Mr. Fraser.”

NOTES ON THE VICTORIAN SPECIES OF *BULLINUS*.

BY

CHARLES HEDLEY, Assistant Curator.

(Plates I-II.)

Those fresh water snails once known in Australia as *Physa*, but now referred to as *Bullinus*, have recently acquired an unpleasant interest. For the spread and nurture of hæmataria, a severe, painful and incurable complaint, has recently been traced to Egyptian representatives of *Bullinus*.

The newly hatched embryo of a Trematode, called *Bilharzia*, enters the *Bullinus* snail and there turns into a sporocyst. Then Bilharzid cercariæ are discharged from the infected snail every day for weeks, more plentifully and continuously in summer. The free-swimming larvæ swarm on the surface of the water in search of a victim. Should they fail to find a host within forty-eight hours they must die. A successful parasite enters the human body either by the mouth or through the skin, and proceeds to establish itself in the rectum or bladder. Arrived at maturity, the parasite sheds innumerable hard-shelled eggs. These erode the mucous membrane, thus causing internal bleeding, a symptom of the disease. Victims may even die from necrosis of the liver or blockage of portal veins.¹

It is presumed if this plague were to be introduced into the Commonwealth from Africa or Asia that the Australian species of *Bullinus* would be ready at any time or place to serve as an intermediate host and so transmit it. Previously an Australian *Bullinus* had been indicted as an intermediate host for the sheep fluke.

The genus thus acquires an importance for medical and official circles. Hence the demand on Conchologists for exact determination of these shells and the present effort to improve the unsatisfactory current nomenclature and identification.

In 1881, a Catalogue of Australian and Tasmanian Freshwater Shells was published by Prof. R. Tate and Mr. J. Brazier.² They enumerated fifty-four "*Physa*," more, as they point out, than half as many as were recorded for the whole world. They remarked on the unsatisfactory and indefinite knowledge of these species. In the following year, but without acquaintance with his predecessor's paper, Mr. E. A. Smith, of the British Museum, revised the Freshwater Shells of Australia. With additions proposed by himself he included fifty-two of "this neglected group" of Australian "*Physa*;"³ but he thought that if his revision had been more complete, several species would be found endowed with a super-abundance of names.

¹ E. T. Leiper—Proc. Roy. Soc. Medicine, ix., 1916, pp. 145-172.

² Tate & Brazier—Proc. Linn. Soc. N.S. Wales, vi., Dec. 1881, pp. 552-569.

³ Smith—Journ. Linn. Soc. Zool., xvi., April, 1882, p. 275.

Induced by these expressions of discontent, Mr. A. H. Cooke undertook an enquiry,⁴ "On the Generic Position of the so called *Physæ* of Australia." He noted several probable synonymic assemblages of the species. On higher taxonomic levels he showed by radula characters that this group should be eliminated from *Physa* and linked with *Planorbis*. For its generic name he selected *Bullinus* proposed by Adanson in 1757. Unluckily for that conclusion, Adanson was a pre-Linnean and not a binomial writer; his nomenclature is, therefore, ineffective. Apparently the place of *Bullinus* may be taken by *Bullinus* which according to Herrmannsen, was duly proposed by Oken.

Chiefly on the evidence of the radula, Cooke classifies *Bullinus* as "not so much a sinistral *Lamnaea* as a spiral *Planorbis*" Reference of *Bullinus* and *Isodora* to the family Planorbidae is further supported by the ciliated epidermis and by the filiform tentacles figured by Lesson,⁵ Tate⁶ and Cobb,⁷ as well as by the non-digitate mantle figured by Chapman.⁸

This group presents the student with exceptional difficulties. The species appear to vary extremely and to limits not yet ascertained. With the honorable exception of Tate's essay in the Zoology of the Horn Expedition, the literature has multiplied names and ignored variation. In the present state of a world war the usual help from correspondents, such as comparison of specimens or drawings, cannot now be obtained. When a time of peace comes it will be necessary to institute a fuller comparison between our species and their reputed types abroad. Thus no positive conclusions are advanced and the matter that follows is presented rather as a means to further inquiry than as the finished result of investigation.

A chance handful from any pool is likely to present individuals with a longer and with a shorter spire. The first lesson to be learnt in studying this group is how changeable a character is this elevation of the spire. The presence or absence, spacing or punctuation, of spiral sculpture, can not be used as a safe guide to specific differentiation. These features are the imprint of spiral threads or lines of ciliæ in the epidermis. But the epidermal coat varies in development according to local conditions, so that lines of ciliæ, which would apparently be otherwise developed, seem to be repressed in unfavourable environment. Yet some geographical series suggest that there are species which never develop such ciliæ.

A more abundant supply of lime allows a deposit on the inner lip and hence longitudinal streaks that mark previous rest stages.

The writer gratefully acknowledges the kindness of the Director of the National Museum, Melbourne, for the loan of types of Tenison Woods. Mr. C. J. Gabriel, who kindly relinquished in my favour the task of reporting on this material, also generously assisted me with the loan of specimens and with information. To Miss P. F. Clarke and Miss J. K. Allan, I am indebted for the illustrations which accompany this paper.

⁴ Cooke—Proc. Zool. Soc., 1889, pp. 136-143.

⁵ Lesson—Zool. Voy. Coquille, 1826, pl. xvi., fig. 5.

⁶ Tate—Horn Exped., Zool., 1896, pl. xix., fig. 25.

⁷ Cobb—Agric. Gazette N.S. Wales, ix., 1898, p. 182, fig. 2.

⁸ Chapman—Mem. Nat. Mus. Melb., v., 1914, pl. i., figs. 2-3.

BULLINUS, Oken.

Bullinus, Oken, Lehrb. d. Naturgesch., iii., 1815, p. 303 (*vide* Herrmannsen, Indicis Gen. Malac., i., 1846, p. 147).

Bulins, Adanson, Histoire Naturelle du Sénégal, 1757, p. 5, pl. i., fig. E. J. L. & Q.: Cooke, Proc. Zool. Soc., 1889, p. 142.

So far as I can ascertain the African species which Adanson studied has not been again recognised. The identity of the type is, therefore, obscure.

BULLINUS TENUISTRIATUS, Sowerby.

(Plate i., fig. 1-6; Pl. ii., fig. 15.)

Physa tenuistriata, Sowerby, Conch. Icon. xix., April, 1873, Pl. x., fig. 85; *Id.*, Tate & Brazier, Proc. Linn. Soc. N. S. Wales, vi., 1881, p. 556; *Id.*, Smith, Journ. Linn. Soc. Zool., xvi., 1882, p. 283; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1886, p. 313, Pl. 45, fig. 12; *Id.*, Billingham, Vict. Nat., x., 1893, p. 63; *Id.*, Tate, Rep. Horn Exped., Zool. ii., 1906, p. 212; *Id.*, Cherry, Bilharziosis, 1917, p. 4, Pl. i., fig. 8. ? *Physa smithi*, Clessin, Conch. Cab. i., Abth. 17, 1885, p. 294, Pl. 42, fig. 2-3.

Var. *PUNCTURATUS*—*Physa puncturata*, Sowerby, Conch. Icon., xix., 1874, Pl. i., fig. 5; *Id.*, Tate & Brazier, Smith and Clessin, *Op. cit.*

Var. *TEXTURATUS*—*Physa texturata*, Sowerby, Conch. Icon., xix., 1874, Pl. xii., fig. 95; *Id.*, Tate & Brazier, Smith and Clessin, *Op. cit.*

Var. *ARACHNOIDEUS*—*Physa arachnoidea*, Tenison Woods, Trans. Roy. Soc. Vict., xiv., 1878, p. 63; *Id.*, Tate & Brazier, Smith and Clessin, *Op. cit.*

Var. *WATERHOUSEI*—*Physa waterhousei*, Clessin, Conch. Cab., *Op. cit.* p. 361, Pl. 51, fig. 6.

There occurs in Victoria and South Australia, either a group of indefinite and closely allied species related to *Bullinus tenuistriatus* or one very variable species whose limits of aberration are not yet ascertained. Thus Tate writes (*Op. cit.*, p. 212):—"I have little doubt that *B. texturatus*, *B. puncturatus* and *B. tenuistriatus* are variants of one species." And Cooke (*Op. cit.*, p. 136, footnote) suggests a still broader union, connecting *B. texturatus* with *B. proteus*, Sowerby, *B. pyramidatus*, Sowerby, *B. dispar*, Sowerby, *B. pectorosa*, Conrad, *B. breviculmen*, Smith, *B. bulia*, Adams & Angas, and *B. concinna*, Adams & Angas.

These opinions are entitled to serious consideration. I have not yet sufficient information either to confirm or to deny them.

B. TENUISTRIATUS (*sensu stricto*). It is to be regretted that when revising this group, Mr. E. A. Smith did not supplement with measurements and other details the incomplete original description of Sowerby. The type of *B. tenuistriatus* came from the Torrens River, near Adelaide, S. Australia. By means of specimens collected there and determined by Prof. Tate, I am enabled to recognise typical specimens in a lot collected at Overland Corner, Victoria by Mr. F. H. Taylor. One of these here figured (Pl. i., figs. 1-2.) is 13 mm. long and 9 mm. broad, very thin and transparent. The suture is margined beneath by a narrow pale line followed by a broader dark band, there is also a broad dark stripe within the outer lip. The sculpture consists of exceedingly delicate radial

threads which may or may not be broken into short lengths by spiral striæ. Mr. C. J. Gabriel also sends this form from Eddington on the Loddor River.

Var. TEXTURATUS.—Sowerby writes of *Physa texturatus* that, "under a lens this appears as if impressed with a fine woven fabric." From this I understand that it is distinguished from typical *B. tenuistriatus* by the impressed spiral lines. Answering to such a description is a specimen, 18 mm. long and 10 mm. broad from the Wimmera River (Cox Coll.) here figured (Pl. i., figs. 3-4). Similar specimens are before me from Mt. Benalla (G. B. Pritchard), Stawell (T. L. Billingham), and Canfield (C. J. Gabriel). Smith reports it as collected by Mr. R. Etheridge, Junr., at Sutton Grange. That gentleman now tells me that he obtained it in 1867, near Mt. Alexander, not far from Castlemaine.

Var. PUNCTURATUS. A form here provisionally identified as *Physa puncturatus*, Sowerby, was gathered by Mr. W. Kershaw in the "Murray Swamps." The sculpture has minute spaced tubercles, arranged in wide spiral lines. The effect is that of the hair scars of *Chloritis*. An example drawn (Pl. i., fig. 5-6.) is 20 mm. long and 11 mm. broad.

Var. WATERHOUSEI. To this species of Clessin is now with hesitation referred a bulimoid form with rounded whorls and elevate spire. The specimen figured (Pl. i., fig. 7-8.) is 20 mm. long and 11 mm. broad. It was given to the Rev. J. E. Tenison Woods by Mr. W. Kershaw, who took it in the "Murray River." A similar form is in the Cox Collection from Gun-bower and from the Wimmera River.

Var. ARACHNOIDEUS. The types lent by the National Museum, Melbourne, consist of four specimens, labelled "*Physa arachnoidea*, Ten. Woods. Type. Near Melbourne. 36001-5." One of these here figured (Pl. ii., fig. 15.) is 13 mm. in length and 6 mm. in breadth. It is a comparatively small and slender form. Even among the type lot there is a difference in sculpture; all have fine, dense, radial hair lines, on one no spiral sculpture is perceptible, on another there are spiral lines of rather distant ciliæ, which correspond to spiral lines on the bare shell. The suture, like that of var. *texturatus*, is frequently edged by a pale above a dark line. The shape is fairly constant. It is common and widespread in Victoria, before me are specimens from Castlemaine (T. L. Billingham), Melbourne (Major Cherry), Echuca (Cox Coll.), Williamstown (C. J. Gabriel) and Overland Corner (F. H. Taylor).

BULLINUS TENUISTRIATUS, var. CONFLUENS,⁹ var. nov.

(Plate i., fig. 9-10.)

Shell elliptical, large and thin, narrowly umbilicate. Spire short with concave outline. Last whorl rapidly increasing, compressed at the periphery. Sculpture, fine and dense radial hair riblets. Length 21 mm., breadth 12 mm.

Hab.—Echuca (type) and Gun-bower (Cox Coll.), Lake Hatton or Haddah (C. J. Gabriel).

⁹ In reference to "Echuca," meaning in the native language "meeting of the waters" of the Murray, Goulburn and Campaspe Rivers.

This form makes a nearer approach to *Physa australiana*, Conrad,¹⁰ than to any other figured species. But that is shown with the anterior lip contracted to a gutter and with a more gibbous shoulder. Conrad's species is 18 mm. long and comes from the Bogan River, N. S. Wales. Probably the type of it is still preserved in the Museum at Logan Square, Philadelphia.

BULLINUS ACUTISPIRA, Tryon.

(Plate i., fig. 11-12; Plate ii., fig. 16.)

Physa acutispira, Tryon, Am. Journ. Conch., ii., 1866, p. 9, Pl. ii., fig. 10; *Id.*, Tate & Brazier, Proc. Linn. Soc. N. S. Wales, vi., 1881, p. 557; *Id.*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 282, Pl. vi., fig. 16; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1885, p. 242, Pl. xxxiv., fig. 1.

Var. YARRAENSIS—*Physa yarraensis*, Tenison Woods, Trans. Roy. Soc. Vict., xiv., 1878, p. 64; *Id.*, Tate & Brazier; Smith & Clessin, *Op. cit.*

Var. TENUILIRATA—*Physa tenuilirata*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 291, Pl. vi., fig. 27.

Var. ETHERIDGII—*Physa etheridgii*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 288, Pl. vi., fig. 25; *Id.*, Clessin, *Op. cit.*

As here construed, *B. acutispira* agrees with *B. tenuistriatus* in the appearance and variation of the sculpture. It is, however, always a smaller, more slender shell, with a sharply pointed and elevated spire. The type is probably preserved in the Museum of the Academy at Philadelphia. It was 12 mm. long and was compared by the author to the common European *Physa hyemorum*. The locality was not described more definitely than "Australia."

Var. YARRAENSIS—The National Museum, Melbourne has forwarded to me three imperfect specimens, labelled "*Physa yarraensis*, Ten. Woods. Type. Upper Yarra. No. 35998-36000." One of these, figured at Pl. ii., fig. 16, is 11 mm. long and 6 mm. broad. It is thin and transparent and sculptured by distant spiral lines of ciliæ. This variety has also been sent from Carrun Creek, Frankston, by Mr. T. Worcester.

Another variety, which in the confused state of nomenclature, it seems unwise for me to name, is figured at Pl. i., fig. 11-12. It is 11 mm. long and 5 mm. broad, with a very tall and slender spire. It was sent by Mr. C. J. Gabriel from Horsham.

Another form is shown at Pl. i., fig. 13, is 13 mm. long and 6 mm. broad, more ovate in shape and more solid in substance. This is sent by Mr. Gabriel from Cape Grant, near Portland.

Mr. E. A. Smith has reported *P. etheridgii* from the Yan Yean Reservoir and a variety of *P. tenuilirata* from the Bunyip River.

BULLINUS ALICIAE, Reeve.

(Plate i., fig. 14, Plate ii., fig. 17-18)

Physa (Aneria) aliciae, Reeve, Proc. Zool. Soc., 1862, p. 106, text figg.;

Id., Sowerby, Conch. Icon., xix., 1874, Pl. i., fig. 6a not 6b; *Id.*, Tate

¹⁰ *Physa australiana*, Conrad, Proc. Acad. Nat. Sci. Philad., v., 1850, p. 11; *Id.*, Conrad, Am. Journ. Conch., ii., 1866, p. 81, Pl. i., fig. 7; *Id.*, Paetel, Cat. Conch. Samml., ii., 1890, p. 403. ? *Physa krefflii*, Clessin (emend), Conch. Cab. i., Abth. 17, 1886, p. 370, Pl. liv., fig. 12.

& Brazier, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 558; *Id.*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 293; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1885, p. 298, Pl. xliii., fig. 2-5; *Id.*, Cooke, Proc. Zool. Soc., 1889, p. 140, fig. 5.

Amplexa turrita, Tate, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 409.

Physa turriculata, Tate & Brazier, *Op. cit.*, p. 558 (Not *Bulla turrita*, Gmelin, Syst. Nat., xiii., 1791, p. 3428, nor *Physa turriculata*, Morelet, Voy. Welwitsch, 1868, p. 92, Pl. ix., fig. 6.)

Var. *KERSHAWI*—*Physa kershawi*, Ten. Woods, Trans. Roy. Soc. Vict., xiv., 1878, p. 64; *Id.*, Smith, Tate & Brazier; and Clessin, *Op. cit.*

Var. *CINGULATA*—*Physa cingulata*, Clessin, Conch. Cab. i., Abth. 17, 1886, p. 364, Pl. li., fig. 8; *Bullinus alicie*, var. *cingulatus*, Billinghamurst, Victorian Naturalist, x., 1893, p. 63.

Herewith is figured the sole type of *Physa kershawi*, Ten. Woods (Pl. ii., fig. 17) from the Upper Yarra, No. 36083 of the National Museum, Melbourne, 7 mm. long, 3.5 mm. broad. In support of the above synonymy, I also illustrate an authentic specimen of *Amplexa turrita* from Ballarat (Pl. i., fig. 14) 20 mm. long and 7 mm. broad, received by the Australian Museum, thus labelled from Prof. R. Tate. I also figure (Pl. ii., fig. 17) the apex of a specimen collected at Lal-lal by Mr. Kershaw. The number and importance of the spiral ridges are, as Smith has already remarked, quite variable.

Hab.—Ballarat (R. Tate), Castlemaine (Billinghamurst), Lal-lal (W. Kershaw) and Avon River (C. J. Gabriel).

BULLINUS PECTOROSUS, Conrad.

Physa pectorosus, Conrad, Proc. Acad. Nat. Sci. Philad., v., 1850, p. 11, and Am. Journ. Conch., ii., 1866, p. 81, Pl. i., fig. 11; *Id.*, Tate & Brazier, Proc. Linn. Soc. N. S. Wales, vi., 1881, p. 556; *Id.*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 279, Pl. vi., fig. 11; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1885, p. 245, Pl. xxxvi., fig. 10; *Id.*, Cooke, Proc. Zool. Soc., 1889, p. 136, footnote; *Id.*, Billinghamurst, Victorian Naturalist, x., 1893, p. 63; *Id.*, Tate, Rep. Horn Exped., Zool., ii., 1906, p. 212.

Physa pinguis, Sowerby, Conch. Icon., xix., 1874, Pl. xii., fig. 93.

Mr. Billinghamurst has recorded this species as rare at Castlemaine. I fear that I was responsible for this identification. This Castlemaine form I now consider to be *B. tenuistriatus* var. *arachnoides*, Ten. Woods.

ISODORA, Ehrenberg.

Isodora, Ehrenberg, Symbol. Phys. Mollusc., &c., 1831, no pagination (fide Germain in de Kerville, Voy. en Kroumisie, Zool. 1908, p. 249); type *Isodora broechii*, Ehrenberg, a variety of *I. contorta*, Michaud, from North Africa.

Isidorella, Tate, Rep. Horn Exped., Zool., ii., 1896, p. 212; type, *Physa newcombi*, A. Adams & Angus, 1863, from Central Australia.

Professor R. Tate correctly segregated from the "Australian Physæ," a group of species in which the columella has no fold. These are readily separated from those above called *Bullinus* by that feature and by a more

retund form. To the diagnosis of Prof. Tate, I would now add that *Isidorella* has the first whorl wound in the same plane, whereas the initial whorls of *Bullinus*, including *Ameria*, are upthrust or mucronate.

Prof. Tate instituted *Isidorella* "on the assumption that the lingual ribbon will afford differential characters," from *Isodora*; but it has not done so. For Cooke showed that the radula of *Isidorella physopsis* is of the same pattern as that of *Ameria aliciae* or of *Isodora contorta*. Though geographical discontinuity might have encouraged Prof. Tate to hold these forms apart, this argument was subsequently weakened by the appearance of *Isodora* in the Moluccas, Celebes and Asia Minor. In Kuster's figure of *I. brocchii*,¹¹ the columella is shown to be without a fold. The weight of evidence is thus towards uniting rather than towards dividing *Isidorella* from *Isodora*.

ISODORA HAINESII, Tryon.

(Plate ii., fig. 19-20-21.)

Physa (Isidora) hainesii, Tryon, Am. Journ. Conch., ii., 1866, p. 9, Pl. ii., fig. 9; *Id.*, Tate & Brazier, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 556; *Id.*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 281; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1886, p. 366, Pl. xlix., fig. 1; *Id.*, Cooke, Journ. of Conch., v., 1887, p. 241.

Physa latilabiata, Sowerby, Conch. Icon., xix., 1873, Pl. v., fig. 33.

Physa ciliosa, Clessin, mss., *Op. cit.*, 1886, p. 351.

Physa schreyeri, Clessin, mss., *Op. cit.*, 1886, p. 366.

Var. *PILOSA*—*Physa pilosa*, Ten. Woods, Trans. Roy. Soc. Viet., xiv., 1878, p. 63; *Id.*, Tate & Brazier; Smith and Clessin, *Op. cit.*

Var. *CREBRECILIATA*—*Physa crebreciliata*, Ten. Woods, Trans. Roy. Soc. Viet., xiv., 1878, p. 63; *Id.*, Tate, Brazier and Smith, *Op. cit.*; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1886, p. 351, Pl. xlix., fig. 10; *Id.*, Chapman, Mem. Nat. Mus. Melb., v., 1914, p. 58, Pl. i., fig. 2.

Physa hirsuta, Ten. Woods, mss.

Var. *BRAZIERI*—*Physa brazieri*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 286, Pl. vi., fig. 22; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1886, p. 237, Pl. xxxvi., fig. 3; *Id.*, Tate, Rep. Horn Exped., Zool., ii. 1896, p. 215.

Some of the names listed above were subordinated by Prof. Tate to *I. newcombi*. Though impressed by his views, I prefer, for the present, to hold that apart. *I. hainesii*, as understood here, is a smaller and more elongate form, which extends to the Pacific coast, while the larger *I. newcombi* seems not to do so.

As pointed out by Smith in the case of *I. brazieri*, the species varies in colour from dark horn brown to pale straw; the spire is more or less elevated and the epidermis is at times more dense and profusely ciliated than at others. The pattern which the epidermis impresses on the shell varies relatively.

¹¹ Kuster—Conch. Cab., i., 1862, Pl. xii., fig. 17-19.

Preserved in Melbourne are four specimens labelled as the types of *Physa pilosa* and registered as 35994-7. The locality is not stated in the description, but these types are labelled "University Ponds." One of these is here illustrated (Pl. ii., fig. 19-20), 13 mm. long and 8 mm. broad. In the original account Tenison Woods doubted if *P. pilosa* was specifically distinct from *P. crebreciliata*, over which it has page precedence. *P. pilosa* is a pale clear isabelline colour, whereas *P. crebreciliata*, is dark brown. *P. pilosa* has also a lower spire, a narrower form and a less developed epidermis than *P. crebreciliata*.

The type of *P. crebreciliata* does not exist under that name in the collection of the Museum at Melbourne. But I have received four specimens, marked "36028-31, *Physa hirsuta*, Ten. Woods, Caulfield." No such species was published by Tenison Woods. The locality, description and comparison of *P. crebreciliata* suit "*hirsuta*," exactly. I presume, therefore, that the name was changed in course of publication, and that the real types of "*crebreciliata*" are the specimens marked "*hirsuta*." These specimens are less globose than the original figure published by Clessin and closely correspond to *Physa brazieri*, Smith, var. *major*, from the Burnett River, Queensland. There are on the body whorl about thirty-two spirals of fine cilæ, decussated by fine close longitudinal lamellæ. The latter, as in the case of *I. newcombi*, rise round the suture into a sort of ruff or collar. But the epidermis is rarely preserved in so perfect a state. Of the four type specimens, the one which is drawn (Pl. ii., fig. 21) has a comparatively elevated spire, while in the other three the spire is much more depressed. It is 12 mm. long and 8 mm. broad.

ISODORA NEWCOMBI, Adams & Angas.

Physa newcombi, A. Adams & Angas, Proc. Zool. Soc., 1863, p. 416 (April, 1864); *Id.*, Sowerby, Conch. Icon., xix., 1873, Pl. iii., fig. 21; *Id.*, Tate & Brazier, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 555; *Id.*, Smith, Journ. Linn. Soc., Zool., xvi., 1882, p. 280; *Id.*, Clessin, Conch. Cab., i., Abth. 17, 1885, p. 299, Pl. xliii., fig. 6; *Id.*, Cooke, Journ. of Conch., v., 1887, p. 242.

Isidorella newcombi, Tate, Rep. Horn Exped., Zool. ii., 1906, p. 213, Pl. xix., fig. 25.

? *Physa subinflata*, Sowerby, Conch. Icon., xix., 1874, Pl. i., fig. 6a, not 5.

VAR. INFLATA—*Physa inflata*, Adams & Angas, Proc. Zool. Soc., 1864, p. 39; *Id.*, Sowerby, Conch. Icon., xix., 1874, Pl. i., fig. 4.

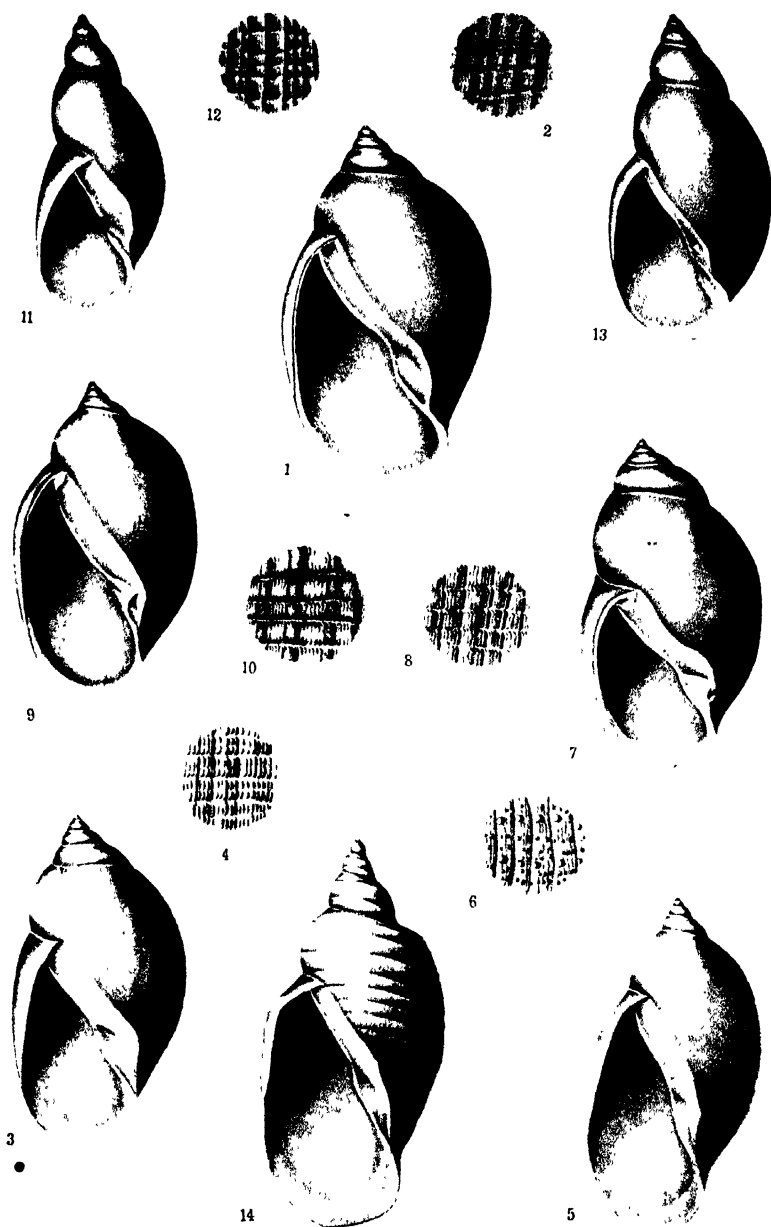
VAR. PHYSOPSIS—*Limnea physopsis*, Cooke, Journ. of Conch., v., 1887, p. 243, Pl. ii., fig. 1-4; *Id.*, Proc. Zool. Soc., 1889, pp. 137-140, fig. 7.

Prof. Tate notes that in arid regions this species prepares for aestivation by burrowing into the mud and closing the aperture with a hemispheric lid of fine silt.

HAB.—Typical form, Bacchus Marsh and Stawell (T. L. Billinghamurst); var. *inflata*, Mount Hope.

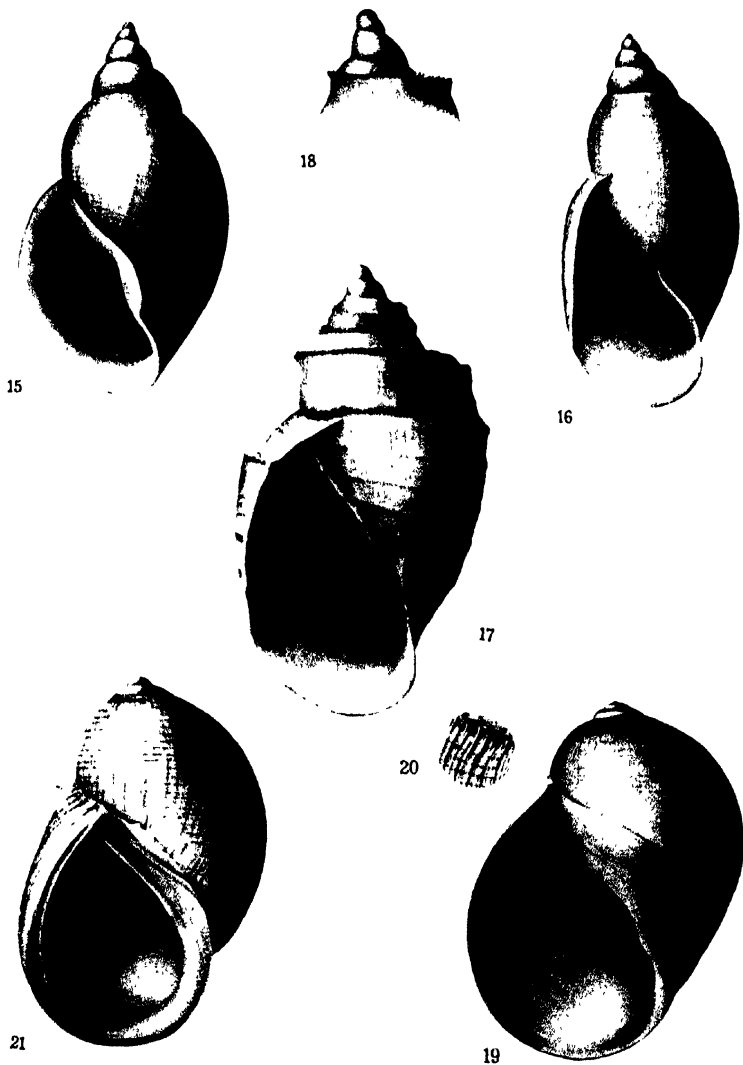
EXPLANATION OF PLATE I.

- Fig. 1. *Bullinus tenuistriatus*, Sowerby, from Overland Corner, Victoria.
2. Sculpture of the same, enlarged.
3. *Bullinus tenuistriatus*, var. *texturatus*, Sowerby, from the Wimmera River.
4. Sculpture of the same, enlarged.
5. *Bullinus tenuistriatus*, var. *puncturatus*, Sowerby, from the Murray Swamps.
6. Sculpture of the same, enlarged.
7. *Bullinus tenuistriatus*, var. *ruiterhousei*, Clessin, from the Murray River.
8. Sculpture of the same, enlarged.
9. *Bullinus tenuistriatus*, var. *confluens*, Hedley, from the type, from Echuca.
10. Sculpture of the same, enlarged.
11. *Bullinus acutispira*, Tryon, var. from Horsham, Victoria.
12. Sculpture of the same, enlarged.
13. *Bullinus acutispira*, var. from Portland.
14. *Bullinus aliciae*, Reeve, from a co-type of *Amplexa turrita*, Tate, from Ballarat.



EXPLANATION OF PLATE II.

- Fig. 15. *Bullinus tennistriatus*, Sowerby, var. *arachnoideus*, Ten. Woods, from the type of *Physa arachnoidea*, Ten. Woods.
16. *Bullinus acutispira*, Tryon, var. *garraensis*, Ten. Woods, from the type of *Physa garraensis*, Ten. Woods.
17. *Bullinus aliciae*, var. from the type of *Physa kershawi*, Ten. Woods.
18. Apex of *Bullinus aliciae*, enlarged, from a specimen collected at Lal-lal by Mr. W. Kershaw.
19. *Isodora hainesii*, Tryon, var. *pilosa*, Ten. Woods, from the type of *Physa pilosa*, Ten. Woods.
20. Sutural ruff of epidermis of the same.
21. *Isodora hainesii*, Tryon, var. *crebreciliata*, Ten. Woods from the presumed type of *Physa crebreciliata*, Ten. Woods.



SOME AUSTRALIAN BLENNIOID FISHES.

By

ALLAN R. MCCULLOCH, Zoologist, and FRANK A. MCNEILL, Junior Assistant,
AUSTRALIAN MUSEUM.

(Plates iii.-iv.)

Owing to the kindness of Professor W. A. Haswell, M.A., D.Sc., we have been enabled to examine the typical examples of the various Blennies described by Sir William John Macleay, which are preserved in the Macleay Museum at the University of Sydney. Some of these can be identified with earlier described species, while we have redescribed and figured the others. We are also indebted to the Acting-Director of the Queensland Museum for the loan of the types of three species described by Mr. Charles W. de Vis, and to Mr. J. Douglas Ogilby for valuable notes upon them.

The Australian Museum collection is rich in good series of various species of *Salaria*s from many localities, which have enabled us to revise those recorded from Australian waters. A large collection was made at Murray Island, Torres Strait, by Messrs. C. Hedley and A. R. McCulloch in October, 1907. Others were secured by Messrs. C. Hedley and E. A. Briggs near Cape Bedford, Queensland, in August, 1916, and at Cairns Reef and Masthead Island, Queensland, by A. R. McCulloch at various times. A particularly valuable series was obtained by Dr. A. D. C. Cummins and Staff Paymaster P. B. Stevens, R.N., in the New Hebrides, while we are fortunate in having Indian specimens for examination which were part of the collection made by Dr. Francis Day. Finally, the Australian Museum collection includes several co-types of species described from Australia which prove to belong to allied genera.

SALARIAS, Cuvier.

*Salaria*s, Cuvier, Règne Anim., ii., 1817, p. 251 (*S. quadripennis*, Rüppell).

The presence of canine teeth has been used to separate *Alticus*, *Lacepède*s, from *Salaria*s, but we find intermediate species in which they are occasionally present or absent. Further, some species, such as *S. fasciatus*, which are described as lacking canines, are found to have a small one on each side of the mandible.

Key to the Australian species:—

- a. Dorsal fin not or scarcely notched between the spines and rays.
 - b. No occipital crest.
 - c. Nuchal tentacles large, fringed; body and fins variegated... ..*fasciatus*.
 - cc. No nuchal tentacles; body and fins nearly black... ..*fuscus*.
 - bb. An occipital crest... ..*spaldingi*.
- aa. Dorsal fin incised between the spines and rays.
 - d. Mandibular canines large; about 17 dorsal and 19 anal rays... ..*irroratus*.
 - dd. Mandibular canines small or absent; 19-23 dorsal and 19-24 anal rays.
 - e. Ocular tentacle simple; 19-20 dorsal rays... ..*virulatus*.
(*S. mulleri*, Klunzinger, apparently enters this section).
 - ee. Ocular tentacles branched.
(*S. kingii*, Cuv. and Val., apparently enters this section).

- f. Upper lip crenulate; 19-20 dorsal rays; body with small, light ocelli.....
meleagris.
 ff. Upper lip not crenulate; 21-23 dorsal rays; body without light ocelli.
 g. Body with thin, dark, longitudinal lines; caudal plain.....*lineatus.*
 gg. Body without longitudinal lines.
 (S. belemnites, de Vis, apparently enters this section).
 h. No occipital crest; soft dorsal and caudal without dark borders.....
dussumieri.
 hh. An occipital crest; soft dorsal and caudal with dark borders.....
geminatus.

SALARIAS FASCIATUS, Bloch.

- Blennius guttorugine*, Forskal, Descr. Anim., 1775, p. 23 (not of Linne).
Blennius fasciatus, Bloch, Ausl. Fisch., ii., 1786, p. 110, pl. clxii., fig. 1.
Id., Bonnatere, Encycl. Méth., Ichth., 1788., p. 53, pl. xxxi., fig. 114. *Id.*, Bloch and Schneider, Syst. Ichth., 1801, p. 167.
Salarias fasciatus, Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 324. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 244. *Id.*, Day, Fish. India, 1876, p. 330. *Id.*, Günther, Fische Südsee, vi., 1877, p. 201, pl. cxv., fig. h. *Id.*, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 336. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, vi., 1881, p. 10. *Id.*, Ogilby, Mem. Qld. Mus., i., 1912, p. 60.
Erpiethys fasciatus, Swainson, Nat. Hist. Class. Fish. Amph. Rept., ii., 1839, p. 275.
Salarias quadriennis, Rüppell, Atl. Reise Nordl. Afrika, 1828, p. 112, pl. xxviii., fig. 2. *S. quadriennis* (emend.), Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 318.
Salarias priamensis, Bleeker, Nat. Tijd. Ned. Ind., iv., 1853, p. 268.
Salarias semilineatus, Kner, Sitzb. Akad. Wiss. Wien, lvi., 1867, fig. 5.
Salarias lineolatus, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 336, pl. xiii., fig. 2. *Id.*, Jouan. Mem. Soc. Nation. Sci. Nat. Cherbourg, xxi., 1877, p. 332.
Salarias griseus, de Vis, Proc. Linn. Soc. N.S.Wales, viii., 1884, p. 450.
Salarias pauper, de Vis, Loc. cit., ix., 1884, p. 695.
Salarias sublineatus, de Vis, *Ibid.*, p. 695.
Salarias furvus, de Vis, *Ibid.*, p. 696.
Alticus griseus, Jordan and Seale, Bull. U.S. Fish. Bur., xxv., 1906, p. 424. *Id.*, Ogilby, Mem. Qld. Mus., iii., 1915, p. 135.
Alticus pauper and *A. sublineatus*, Ogilby, *Ibid.*
 D. xii-xiii/18-19; A. ii/20; P. 14; V. 2; C. 11 vel 13. Depth at the vent 4 in the length to the hypural joint; head 4.2-4.9 in the same. Eye 3.3-3.6 in the head. Penultimate dorsal spine 1.6-1.8, median dorsal rays 1.05-1.2, third anal ray 1.1-1.4 in the head.
 Head about as high as long, with the forehead vertical and projecting slightly before the eyes. Interocular space concave. No occipital crest. A large branched ocular tentacle, and a smaller one at each anterior nostril; nuchal tentacles approximate, broad and fringed. A very small internal canine is present on each side of the mandible. Margin of upper lip entire, maxilla reaching slightly beyond the hinder orbital border.

Dorsal fin not notched, though the last spine does not reach its margin; the length of the spinous portion is less than that of the soft, and its margin is a little rounded. Median dorsal rays highest, the last united with the basal portion of the caudal by membrane. Anal commencing below the posterior dorsal spines; its anterior rays are a little produced, and the succeeding ones are subequal in length; the last is united by membrane to the caudal peduncle. Pectoral rounded, the sixth lowest ray longest, reaching the vertical of the tenth or eleventh dorsal spine. Ventrals inserted well before the first dorsal spine, the inner ray longest, and reaching half its distance from the vent. Caudal slightly rounded or subtruncate.

Colour marking.—Light brown in alcohol, with eight broad darker cross-bands, which are distinct in the young and indefinite in larger specimens; they may enclose lighter spots towards the ventral surface. Anteriorly the body is ornamented with many dark brown dots towards the back, which give place to thin undulating lines on the sides; posteriorly there are about two rows of rounded blue spots on the upper half of the side, and some larger brown spots on the caudal peduncle. Head with brown dots above, and a dark mark from the eye to the mouth, and others across the preopercular and opercular borders; a broad bluish brown cross-band covers the throat and is separated from another before the ventrals by a narrow, light interspace; these may be indistinct, particularly in older specimens. Dorsal fin with dark blotches basally, which are continuations of the cross-bands of the body; each of these divides into two broad, darker bands, which curve upwards and forwards; narrow dark lines cross the fin in the opposite direction and end in dark spots near the margin; on the spinous dorsal the broader bands are formed of anastomosing darker lines, which enclose light, rounded spots, and form a characteristic chequered pattern on the fin. Anal fin dusky, with some dark blotches basally, caudal plain. Pectorals and ventrals light coloured, with well defined brown spots on the rays; broad brown markings enclosing lighter spots are present on the base of the pectoral.

Described from two specimens 81 and 125 mm. long. The younger differs from the older specimen only in having its markings much better defined, which is characteristic of smaller specimens of this species.

Variation.—A good series of specimens exhibits considerable variation in the details of the colour marking, and in the relative lengths of the fin rays and spines. The anal may be very light in colour, or dark grey, with lighter and darker spots. The caudal is either plain or closely speckled with grey dots, or with larger darker spots. In very small examples the darker spots and lines on the anterior portion of the body are wanting. The junction of the spinous and soft portions of the dorsal is indicated by a very slight emargination in some specimens, and the anterior anal rays may be either greatly produced or of equal length to the others. Finally, the tentacles of very young specimens are less branched than in older examples.

Synonymy.—The identity of *S. lineolatus*, Alleyne and Macleay, with *S. fasciatus*, has already been noted by Ogilby, and an examination of the holotype proves his conclusion to be correct. The holotypes of *S. pauper*, de Vis, and *S. sublineatus*, de Vis, are completely bleached, but are

identical with *S. fasciatus* in all structural details. Two cotypes of *S. griseus*, de Vis, retain some of the blue spots on the hinder portion of the body, while the pectorals, ventrals, and caudal show vestiges of their colour marking; they likewise are identical with *S. fasciatus*. The holotype of *S. furvus* is badly stuffed, and retains but few of its distinguishing characters, but agrees with *S. fasciatus* in all that remain.

We are indebted to Mr. J. Douglas Ogilby for much assistance in the compilation of the above synonymy, and for valuable notes on variation, etc. He also enabled us to examine the types of *S. griseus*, *S. sublineatus* and *S. pauper*, while that of *S. furvus* was seen by the senior author at an earlier date.

Locs.—We have examined Australian specimens from the following localities:—Murray Island, Torres Strait; coll. Hedley and McCulloch. Darnley Island, Torres Strait; holotype of *S. lineolatus*. Cape Grenville, Queensland; coll. "Chevert" Expedition. Two Isles, off Cape Bedford, Queensland; coll. Hedley and Briggs. Dunk Island, Queensland; coll. E. J. Banfield. Cardwell, Queensland; holotypes of *S. pauper* and *S. sublineatus*. Masthead Island, Queensland; coll. A. R. McCulloch.

S. fasciatus ranges from the Red Sea and east coast of Africa to the Pacific, reaching Samoa and Tonga.

SALARIAS FUSCUS, Rüppell.

Salarias fuscus, Rüppell, Neue Wirbelth., Fische, 1835, p. 135, pl. xxxii., fig. 2. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 245. *Id.*, Day, Fish. India, 1876, p. 330, pl. lxx., fig. 2, and Supplement, 1888, p. 797. *Id.*, Günther, Fische Südsee, vi., 1877, p. 202, pl. cxvi., fig. c. *Id.*, Weber, "Siboga" Exped., Fische, 1913, p. 530.

Salarias ruficandus, Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 328.

Salarias phaeosoma, Bleeker, Nat. Tijdschr. Ned. Ind., viii., 1855, p. 317.

Salarias holomelas, Günther, Ann. Mag. Nat. Hist. (4), x., 1872, p. 399.

Id., Jordan and Seale, Bull. U.S. Fish. Bur., xxv. 1906, p. 431.

Specimens from Queensland do not differ from one received from Dr. Francis Day, which was collected at Sind, India. Jordan and Seale have suggested that the black colour of the caudal fin distinguishes *S. holomelas* from *S. fuscus*, but the Queensland examples include both forms, and thereby indicate that this character is not of specific value.

Though this species is described as without canines, a very small internal tooth is present on each side of the mandible.

Locs.—Murray Island, Torres Strait; coll. Hedley and McCulloch. Masthead Island, off Port Curtis, Queensland; coll. Dene B. Fry, 1910. Sind, India; Dr. Day's Collection. Friendly Islands and New Hebrides, South Pacific.

SALARIAS SPALDINGI, Macleay.

(Plate iii., fig. 1.)

Salarias spaldingi, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 359, pl. ix., fig. 4, and *Loc. cit.*, vi., 1881, p. 12.

Salarias punctillatus, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 389. *Id.* Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 37.

D. xii/19; A. ii/20; P. 14; V. 2; C. 13. Depth equal to the length of the head, and nearly 5 in the length to the hypural joint. Eye 3.1 in the head. Last dorsal spine 2, sixth dorsal ray 1.1, and the fifth last anal ray 1.5 in the head.

Head about as high as long, with the forehead subvertical. Eyes close to the upper anterior profile, separated by a narrow concave inter-orbital space. A crest is present on the occiput. Nasal, ocular and nuchal tentacles present, all short and simple. A single row of fine teeth in each jaw, and a stout, curved, internal canine is present on each side of the mandible.

Dorsal fin not notched, but the spinous portion lower than the soft. The spines increase slightly in length backwards, and the base of the spinous portion of the fin is shorter than that of the soft dorsal. The rays are subequal in height, and the last is joined to the base of the caudal by membrane. Anterior anal rays a little produced, filamentous; the others subequal, and the last united to the caudal peduncle by membrane. Pectoral obtusely pointed, fifth lowest ray longest, but not reaching the vertical of the vent. Inner ventral ray longest, reaching almost half its distance from the vent. Caudal a little rounded, most of its rays bifurcate.

Colour marking.—Light greyish brown after long preservation in alcohol, with eight broad brown cross-bands which are much broken up by lighter spots anteriorly. Base of pectoral and breast with broad brown markings enclosing lighter spots. Head mottled with rounded lighter spots and brown markings, which extend across the throat. Small blue ocelli are present on the upper portion of the dark cross-bands posteriorly. Dorsal fin with dark blotches, which are continuations of the cross-bands of the body; these curve forward and tend to form two horizontal bands on the outer half of the spinous dorsal. Anal dusky, darker towards its margin; the other fins plain, the caudal with two dark basal blotches.

Described and figured from a cotype preserved in the Macleay Museum, 76 mm. long. Twelve others, 34-84 mm. long, do not exhibit any marked variation, though the cross-bands are more distinct in some than in others.

Synonymy.—Klunzinger suggested the identity of his *S. punctillatus* with *S. spaldingi*, but Macleay believed the two to be distinct. Klunzinger's description agrees with Macleay's specimens quite well in all structural details, and the slight differences in the colour marking is evidently due to variation.

Loc.—Port Darwin, Northern Territory.

Salarias irroratus, Alleyne and Macleay.

(Plate iii., fig. 2.)

Salarias irroratus, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 337, pl. xiii., fig. 4. *Id.*, Macleay, *Loc. cit.*, vi., 1881, p. 12. *Id.*, Ogilby, Mem. Qld. Mus., i., 1912, p. 60.

Salarias calvus de Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 697.

D. xii/17; A. 19; P. 14; V. 2; C.13. Depth 4.7 in the length to the hypural joint; head 5 in the same. Eye 3.2 in the head. Median dorsal spines 2.3, and median dorsal rays 1.4 in the head. Third anal ray 0.2 longer than the head.

Orbit forming the anterior profile of the head, and projecting beyond the jaws. A very low obtuse ridge on the occiput and nape. Maxillary reaching beyond the vertical of the hinder margin of the eye. A single row of fine teeth in each jaw, and a small incurved internal canine on each side of the mandible. Head with series of simple pores around the eyes, across the nape, around the preoperculum, and on each side of the mandible. A simple tentacle behind the anterior nostril and another surmounting the eye, while a shorter broader one is present on each side of the neck.

Dorsal fin originating above the operculum, distinctly notched, the spinous portion a little shorter than the soft; the spines increase in height towards the middle, but the longest is not so high as the rays, and the last is much shorter than the penultimate. Soft dorsal a little rounded, median rays longest, and the last united by membrane to the extreme base of the caudal. Anal ray somewhat produced and filiform anteriorly, the third the longest, the others decreasing backwards; the last is connected by membrane to the peduncle. Pectoral rounded, and formed wholly of simple rays, the sixth lowest being the longest. Ventrals of two simple rays, inserted before the pectorals, but behind the vertical of the dorsal origin; the inner is the longer, and reaches about half its distance from the vent. Caudal rounded, its inner rays bifurcate.

Colour marking.—Brown in alcohol, closely mottled on the anterior half with white spots and reticulating lines. Head brown, with white stellate dots, which are largest on the throat, where they combine to form streaks. Two large brown (blue) spots are present on the throat. A dark streak defines the preoperculum. Base of the pectoral and breast with three large white spots on each side enclosed in brown lines. Body closely covered with white spots, which are largest on the sides of the abdomen, and there are about four broad brown bands anteriorly; on the posterior half of the trunk the marking gives place to brownish dots, which are enlarged above the anal fin, and are arranged in groups along the base of the dorsal. Spinous dorsal with a few darker dots, the rest of the fin almost hyaline. Caudal with irregular rows of dark dots crossing its lower half. Anal with a grey dot at the base of each ray, and a broad submarginal darker band of microscopic dots.

The above description is based upon the holotype of the species, 63 mm. long, in the Macleay Museum. It is not so well preserved as a cotype of *S. calvus* in the Australian Museum, which has, therefore, been used to supplement the description of the colour marking. The accompanying figure is based on de Vis' specimen.

Alleyne and Macleay counted the number of fin-rays incorrectly in their only specimen, and they overlooked the small internal mandibular canines. The cotype of *S. calvus* differs from its brief description in having nasal, ocular and nuchal tentacles, and internal mandibular canines. A critical comparison of these two specimens leaves no doubt that they represent the same species.

Variation.—The occipital ridge is not always developed, and is generally absent in smaller specimens. The anterior anal rays are produced in most larger specimens, but they may be shorter than the succeeding ones, as in the holotype of *S. calvus*. Specimens preserved in formaline do not show the white stellate markings which form such a striking feature in the alcohol examples, their markings consisting principally of darker spots arranged in the manner illustrated.

Locs.—Low Island, Torres Strait; holotype of *S. irroratus*. Murray Island, Torres Strait; cotype of *S. calvus*. Murray Island, Torres Strait; coll. Hedley and McCulloch. Two Isles, near Cape Bedford, Queensland; coll. Hedley and Briggs. New Hebrides, South Pacific.

SALARIAS RIVULATUS, Rüppell.

(Plate iii., figs. 3-4.)

Salarias rivulatus, Rüppell, Atlas Reise Nordl. Afrika, 1828, p. 114 and Nene Wirbelth., Fische, 1835, pp. 134-135, pl. xxxii., fig. 1. *Id.*, Jordan and Seale, Bull. U.S. Fish. Bur., xxv., 1906, p. 429.

Salarias quadricornis, Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 329, pl. cccxxix. *Id.*, Day, Fish. India, 1876, p. 331, pl. lxx., fig. 4 (references).

D. xiii/19-20; A. ii/21-22; P. 14; V.3; C.13. Depth at the vent 4.8 in the length to the hypural joint; head 4.1-4.2 in the same. Eye 4.1-4.4 in the head. Second dorsal spine 1.7-1.8, median dorsal rays 1.3-1.4, longest anal ray 1.7-1.8 in the head.

Head much longer than high, the forehead subvertical. Eye separated by a very narrow interorbital space. Occipital crest present in one sex, wanting in the other. A small branched tentacle at the anterior nostril, a larger simple one above the eye, and a simple one on each side of the neck. No mandibular canines. Margin of the upper lip entire; maxilla reaching behind the vertical of the eye.

Dorsal fin deeply notched, commencing above the operculum; the spinous portion is much shorter than the soft. Median dorsal rays longest, the last united with the base of the caudal fin. Anal commencing beneath the posterior dorsal spines and increasing in height backwards, the last ray not united to the caudal peduncle by membrane. Pectoral rounded, the fifth or sixth lowest ray longest, and reaching to below the tenth or eleventh dorsal spine. Median ventral ray longest, reaching less than half its distance from the vent; the inner ray is slender, and closely adpressed to the second. Caudal slightly rounded.

Colour marking—Male:—Dark grey in alcohol, with about six paired darker cross-bands, which are most distinct towards the middle of the body; intermediate irregular markings are also present. A dark stripe extends from the eye across the mouth on each side, and a blackish spot is present behind the eye. First dorsal with about five broad, dark bands disposed more or less horizontally, the basal ones broader than those towards the margin. Second dorsal with oblique dusky bands, separated by narrow light bands; these form darker spots on the rays, and combine to form a dusky margin to the fin. Anal dusky, with narrow, longitudinal, light stripes. Caudal and pectoral almost plain, the latter with some indefinite cross-bars. Female:—Light grey in alcohol, with

well defined, paired cross-bands, which are of irregular form and much interrupted by intermediate markings; the posterior half with rounded, dark spots. Head markings similar to those of the male. Dorsal fins closely covered with dark spots, which tend to form horizontal rows on the spinous portion, and oblique ones on the soft. Anal with dark spots in longitudinal rows. Caudal and pectorals almost plain, the former with some dark spots basally.

Described and figured from two specimens 114-120 mm. long, from Masthead Island. Though differing in the colour marking, they are evidently sexual forms of the same species, since we find the same characters in series of specimens from several localities. Those in which the fins are spotted lack the occipital crest, while specimens in which it is present have the fins striped; smaller specimens exhibit characters which are intermediate between the two adult forms.

Locs.—Masthead Island, off Port Curtis, Queensland (figured specimens); coll. A. R. McCulloch. Murray Island, Torres Strait; coll. Hedley and McCulloch. Lord Howe Island, New Hebrides, Samoa and Funafuti.

SALARIAS MULLERI, Klunzinger.

Salaris mulleri, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx., 1879, p. 388.

Id., Weber, "Siboga" Exped., lvii., 1913, p. 535.

The specimens on which this species was based were said to have been obtained in Hobson's Bay, Victoria, but no species of the genus is known to occur so far south. Specimens from the Indo-Australian Archipelago have been identified by Weber as *S. mulleri*. The species is unknown to us.

SALARIAS MELEAGRIS, Cuvier and Valenciennes.

Salaris meleagris, Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 332. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 256 and Fische Südeee, vi., 1877, p. 208. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 316. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 388. *Id.*, Macleay, Proc. Linn. Soc. N.S. Wales, vi., 1881, pp. 11 and 13.

Salaris biseriatus, Alleyne and Macleay, Proc. Linn. Soc. N.S. Wales, i., 1877, p. 336 (not *S. biseriatus*, Cuvier and Valenciennes.)

D. xii-xiii/19-20; A. i-ii/19-20; P. 14; V. 3; C. 13. Depth 4.6-5.4 in the length to the hypural joint; head 4.4-4.8 in the same. Eye 3.09-4.2 in the head. Third dorsal spine 1.9-2, thirteenth dorsal ray 1.3-1.7, seventeenth anal ray 1.6-2.1 in the head.

Head longer than high, with the forehead subvertical. Eyes separated by a very narrow concave interorbital space. Occipital crest present or absent. A large ocular tentacle, which is fringed on both sides; nasal tentacle palmate; a simple nuchal tentacle present or absent, occasionally developed on one side only. No mandibular canine. Upper lip with a crenulate margin. Maxillary reaching well beyond the eye.

Dorsal fin deeply notched, the second or third spine highest, but much lower than the rays; the length of the spinous portion is a little shorter than that of the soft. Dorsal rays increasing slightly in length

to about the hinder fourth of the fin, the last united to the caudal peduncle, but the membrane does not reach the rays. Anal commencing beneath or in advance of the incision of the dorsal; its rays increase in length towards the hinder part of the fin, and the last is not joined to the caudal peduncle by membrane. Pectoral obtusely pointed, sixth lowest ray longest, and reaching to below the ninth dorsal spine. Ventral with two thick and one slender inner ray, the median the longest, and extending backwards a little more than one third of its distance from the vent. Caudal slightly rounded or subtruncate.

Colour marking.—Brown in alcohol, with about seven more or less distinct darker cross-bands; these are very angular, and are defined on the back by paired blackish spots. Sides with irregular rows of silvery ocelli, which are most distinct towards the tail. Head with small light ocelli, and some darker markings on the throat, which may be indistinct; a bluish black spot behind the eye. First dorsal with about five broad, dark bars running upwards and backwards. Second dorsal with oblique dark stripes, separated by narrow light lines, which tend to break up into spots towards the margin. Anal with two or more rows of light spots tending to form horizontal stripes, or closely speckled with light dots; the margin may be dark or light-edged. Caudal nearly plain in specimens, without crests, closely dotted and streaked with light markings between the rays in those in which it is present. Pectorals plain, or with one or two broad cross-bands near the base.

The above definition is based on eleven specimens, 46-124 mm. long, which were taken together at Eagle Island, Northern Queensland. They agree very well with the original description of the species and also with Günther's figure of a Cape York specimen in "Fische Südsee," though the latter illustrates the last dorsal ray as wholly free from the caudal peduncle. A large number secured at the same time exhibit some little variation in the intensity and exact form of their colour marking, which, however, is essentially as described above.

Variation.—A single example from Masthead Island is remarkable for its dark colouration, which almost hides its characteristic markings. It is greyish brown in alcohol, with only obscure traces of the darker cross-bands; the whole body is flecked with blackish puccinings, through which the light ocelli are but little apparent. First dorsal nearly uniform brown, with oblique light lines posteriorly. Second dorsal brown, with narrow, interrupted, oblique, light lines. Anal with several rows of light spots, caudal with light lines and spots between the rays.

Locs.—Eagle Island and Two Isles, Northern Queensland; coll. Hedley and Briggs. Rat Island, Port Curtis, and Masthead Island, Queensland; coll. A. R. McCulloch. Caloundra, Southern Queensland. Port Darwin, Northern Territory; coll. H. W. Christie.

This species was said to have been originally obtained by Peron in Tasmania, but no species of the genus occurs so far south. Johnston¹ noted that it was common in Tasmanian waters, but his reference doubtless applied to *Bleinnius tasmanianus*.

¹ Johnston—Proc. Roy. Soc. Tasm., 1882 (1883), p. 121.

SALARIAS LINEATUS, Cuvier and Valenciennes.

(Plate iv., fig. 1.)

Salarias lineatus, Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 314. *Id.*, Bleeker, Verh. Bat. Genootsch., xxii., 1849, Blenn. Gobioid, p. 18. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 254. *Id.*, Day, Fish. India, 1876, p. 332, pl. lxx., fig. 8. *Id.*, Jordan and Seale, Bull. U.S. Fish. Bur., xxv., 1906, p. 426.

D. xiii/23; A. ii/24; P. 14; V. 2; C. 13. Depth 6 in the length to the hypural joint; head 5 in the same. Eye 4.2 in the head. Fourth dorsal spine 1.1, seventeenth dorsal ray 1.2, third last anal ray 1.5 in the head.

Head longer than high, the forehead subvertical; a high occipital crest present in one sex, wanting in the other. A broad palmate tentacle above the eye, and a shorter one at the anterior nostril; no nuchal tentacle. Mouth reaching well beyond the vertical of the hinder orbital margin. A single row of teeth in each jaw; no canines.

Dorsal fin deeply notched, commencing above the hinder part of the operculum, the spinous portion much shorter than the soft; the spines are subequal in length in the anterior and median portions of the fin, shorter posteriorly. Dorsal rays increasing slightly in length towards the posterior portion of the fin, the last joined by membrane to the base of the caudal. Anal rays increasing a little in length backwards, the last not joined by membrane to the peduncle. Pectoral a little pointed, formed of simple rays, the fifth lowest the longest and not nearly reaching the vertical of the vent. Inner ventral ray longest, reaching backward more than one-third its distance from the vent. Caudal rounded, the inner rays bifurcate.

Colour marking.—Light brown in alcohol, with thin darker longitudinal lines extending along the sides; about six pairs of blackish spots on the back, descending obliquely forward. Head with vertical wavy lines. Dorsal fins with oblique darker lines, which on the soft portion form a submarginal series of zig-zag lines; the outer portion of both fins greyish. The other fins plain, the anal with a somewhat darker margin.

Described and figured from a specimen 103 mm. long, from the New Hebrides, which is apparently a male. Others taken with it and supposed to be females differ in lacking the occipital crest, while the second dorsal has no submarginal band of zig-zag lines. These differ from an Indian specimen only in having the lines on the side of the body narrower.

Locs.—Murray Island, Torres Strait; coll. C. Hedley and A. R. McCulloch. Andaman Islands; Dr. Francis Day's Collection. New Hebrides; coll. Cummins and Stevens.

SALARIAS DUSSUMIERI, Cuvier and Valenciennes.

(Plate iv., fig. 2.)

Salarias dussumieri, Cuvier and Valenciennes, Hist. Nat. Poiss., xi., 1836, p. 310. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 251. *Id.*, Day, Fish. India, 1876, p. 333, pl. lxx., fig. 7.

Salarias auridens, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 338, pl. xiv., fig. 2. *Id.*, Macleay, *Loc. cit.*, vi., 1881, p. 12. *Salarias cheverti*, Macleay, Proc. Linn. Soc. N.S.Wales, vi., 1881, p. 12.

D. xiii/21; A. i/22; P. 14; V. 2; C. 13. Depth 5 in the length to the hypural joint; head 5 in the same. Eye 3.5 in the head; interorbital space 4 in the eye. Median dorsal spines 2, median dorsal rays 1.5, posterior anal rays 2 in the head.

Head longer than high, with a subvertical forehead; no occipital crest. A large arborescent ocular tentacle, and a small one at each anterior nostril; no nuchal tentacle. Mouth reaching well beyond the vertical of the hinder orbital margin. Teeth very small, in a single row in each jaw; no canines present in either.

Dorsal fin deeply notched, commencing above the posterior part of the operculum, the spinous portion a little shorter than the soft; the median spines are the longest, and the margin of the fin is slightly rounded. Dorsal rays subequal, highest in the middle of the fin, and longer than the spines; the last is joined by membrane to the extreme base of the caudal. Anal rays increasing in length slightly backwards, the last not united to the peduncle by membrane. Pectoral obtusely pointed, the fifth lowest ray the longest and not quite reaching the vertical of the vent. Inner ventral ray longest, reaching less than half its distance from the vent. Caudal rounded, the inner rays bifurcate.

Colour marking.—General colour, dark brown in alcohol, lighter posteriorly, with some obscure darker cross-bands on the hinder portion of the back, and dark brown spots on the tail region. The head is obscurely mottled on the operculum and throat, and three dark bars descend from the eyes across the lips. Dorsal fins with rows of angular dark brown spots, connected by lines, and together forming a more or less zig-zag pattern which runs parallel to their margins; soft dorsal with oblique lines on its basal half. Caudal with irregular transverse rows of dark spots on the rays. Pectoral and posterior portion of anal obscurely spotted, the latter fin with an indefinite darker submarginal band.

The above description is based upon the holotype of *S. auridens*, 84 mm. long, and supplemented with notes on the colour marking of additional specimens from Murray Island which agree in all details with Alleyne and Macleay's example. One of the latter, 94 mm. long, is figured.

Another specimen from Two Isles, off Cape Bedford, is much lighter in colour and shows the transverse body-bars and head markings much more definitely than the others.

Synonymy.—We have compared these specimens with an example from the Andaman Islands, which was identified by Dr. Day as *S. dussumieri*, and find no differences between them.

S. cheverti, Macleay, is represented in the Macleay Museum collection by several cotypes, all of which differ from the very imperfect description of that species in having more numerous spines and rays in the dorsal and anal fins, and in their colouration. But they are clearly labelled, and are evidently the specimens upon which the species is based. They are covered with a light bluish sediment, but when this is removed they are found to have the same colour marking as the holotype of *S. auridens*, to which they are similar in all details.

Locs.—Darnley Island, Torres Strait; holotype of *S. auridens*. Murray Island, Torres Strait; coll. C. Hedley and A. R. McCulloch. Two Isles, off Cape Bedford, Queensland; coll. C. Hedley and E. A. Briggs.

Salarias geminatus, Alleyne and Macleay.

(Plate iv., fig. 3.)

Salarias geminatus, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 336, pl. xiii., fig. 3.

Salarias cristiceps, Alleyne and Macleay, *Ibid.*, p. 338, pl. xiv., fig. 3.

D. xii/22; A. ii/23; P. 14; V. 3; C. 13. Depth 5.7 in the length to the hypural joint; head 5.2 in the same. Eye 3.8 in the head; inter-orbital space 4.2 in the eye. Median dorsal spines 1.6, median dorsal rays 1.2, median anal rays 1.5 in the head.

Head longer than high, with a subvertical forehead. Occipital crest well developed. A large branched ocular tentacle; nasal tentacle minute, feebly branched; no nuchal tentacle. Mouth reaching well beyond the vertical of the hinder orbital margin. A minute internal canine is present on each side of the mandible.

Dorsal fin deeply notched, commencing above the hinder portion of the operculum, the spinous portion much shorter than the soft. The median spines are slightly longer than the others, but are lower than the rays. Dorsal rays subequal, the median one slightly longer than the others, the last united to the base of the caudal. Median anal rays longest, the last not connected to the caudal peduncle by membrane. Pectoral obtusely pointed, the fifth lowest ray longest, and reaching the vertical of the ninth dorsal spine. Median ventral ray longest, reaching less than half its distance from the vent; the inner ray slender and closely adpressed to the second.

Colour marking.—Body with broad, dark, paired cross-bands, which are most distinct beneath the soft dorsal. On the back there are corresponding paired, blackish spots, with light interspaces between them. Towards the caudal peduncle there are some indefinite dark spots. Spinous dorsal with some broad, sinuous, subhorizontal dark stripes. Second dorsal with oblique stripes, separated by narrow light lines; these are expanded and darker in the basal portion of the fin, and they form undulating lines on a dark submarginal band; extreme margin white. Caudal with a broad, submarginal band, similar to that of the second dorsal. Anal dusky, darker towards its margin.

Described from the holotype of the species, 101 mm. long; it is much faded, but exhibits most of the characteristic colour marking described above. The accompanying figure represents a specimen 107 mm. long from Murray Island, Torres Strait.

Variation.—The very small canine tooth is not always easily detected in this species, and is apparently present in larger examples only, but is wanting in those of smaller size. The posterior anal ray is usually free from the caudal peduncle, but may be joined to it by membrane. In eight specimens we find xiii/21-22 dorsal rays, and i-ii/22-24 anal rays; Macleay wrongly counted the number of dorsal and anal rays in the holotype.

Synonymy.—The holotype of *S. cristiceps*, 54 mm. long, is much discoloured, but exhibits distinct markings which are similar to those of *S. geminatus*, to which it is also similar in all structural details.

This species is allied to *S. meleagris*, but differs in having more numerous dorsal and anal rays, and in lacking nuchal tentacles; the colour marking also is different.

It is not improbable that *S. geminatus* is merely the male form of *S. dussumieri*. The two species are similar in all structural details, and the differences in the colour marking are not more pronounced than those we find in the sexual forms of *S. rivulatus*.

Locs.—Torres Strait; holotype of *S. geminatus*. Darnley Island, Torres Strait; holotype of *S. cristiceps*. Murray Island, Torres Strait; coll. Hedley and McCulloch.

CIRRIPECTES Swainson.

Cirripectes, Swainson, Nat. Hist. Classific. Fish. Amph. Rept., ii., 1839, pp. 182, 275 (*Salaria variolosus*, Cuvier and Valenciennes). *Cirripectus*, Id., *Ibid.*, p. 79. Id., Weber, "Siboga" Exped., lvii., 1913, p. 536.

! *Eaallias*, Jordan and Evermann, Bull. U.S. Fish. Bur., xxiii. i., 1905, p. 503 (*Salaria brevis*, Kner).

This genus includes the species of *Salaria* which have a row of cirri crossing the neck to the opercular lobes, and the upper lip fringed with short tentacles; a curved internal canine is present on each side of the mandible. In addition to the genotype, *S. variolosus*, C. and V., this genus includes *S. variolatus*, Cuvier and Valenciennes (= *S. cuvieri*, Günther), *S. sebae*, Cuvier and Valenciennes and *S. alboapicalis*, Ogilby, Weber regards *Eaallias* as synonymous with *Cirripectes*, but its genotype, *E. brevis*, Kner, apparently lacks mandibular canines.

CIRRIPECTES FILAMENTOSUS, Alleyne and Macleay.

Salaria filamentosus, Alleyne and Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 337, pl. xiv., fig. 1. Id., Macleay, *Ibid.*, vi., 1881, p. 12. *Salaria alboapicalis*, Ogilby, Mem. Qld. Mus., ii., 1913, p. 90 (not of Ogilby, 1899).

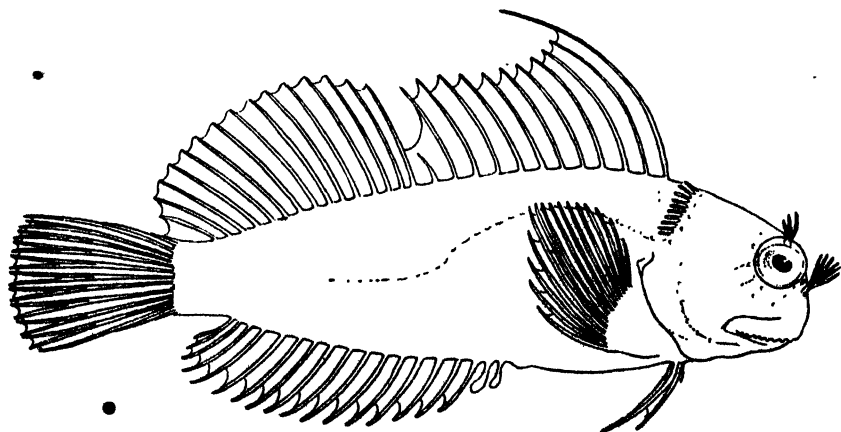


Fig. 1.—*Cirripectes filamentosus*, Alleyne and Macleay. Holotype, 70 mm. long, from Cape York.

D. xii/15; A. ii/16; P. 15; V. i/3; C. 13. Depth 3.1 in the length to the hypural joint; head 3.6 in the same. Eye 3.4 in the head; inter-orbital space about 4.5 in the eye. First dorsal spine 0.4 longer than the head. Third dorsal ray 1.2, eighth anal ray 1.9 in the head.

Head rounded, about as high as long. No occipital crest. A branched tentacle, divided into several filaments, is present at each anterior nostril and above the eyes; a row of simple tentacles extends from the nape on each side towards the gill-opening, but is slightly interrupted on the median line. Upper lip fringed with obtuse lobules. A single row of fine teeth in each jaw, and a rather large, curved, internal canine on each side of the mandible.

Dorsal fin deeply notched, originating above the operculum, the spinous a little longer than the soft; the anterior spines are filamentous and decrease backwards, but the penultimate is as long as the anterior ray, and as long as the postorbital portion of the head. Dorsal rays highest in the anterior portion of the fin, decreasing slightly backwards, the last united with the base of the caudal. Anal spines surmounted by thickened, globular, and fleshy appendages; the rays increasing in length towards the posterior portion of the fin, the last not united with the peduncle by membrane. Pectoral obtusely pointed, the rays simple, the fifth lowest longest. Median ventral ray longest, reaching more than half its distance from the vent, the inner ray slender and closely adpressed to the second. Caudal subtruncate, the inner rays bifurcate.

Colour.—Uniform brown after long preservation. Some minute light spots behind the pectorals are possibly the remnants of colour marking.

Described from the holotype of the species 70 mm. long, which proves its original description to be inaccurate in several important details. The dorsal and anal rays number 15 and 16 respectively, instead of 20 and 20. Large curved mandibular canines are present, but are difficult to detect owing to the shrivelled condition of the specimen. Nasal tentacles are present on the anterior nostrils only, instead of on every nostril as described. Notwithstanding these discrepancies, the specimen is clearly that upon which the name was based.

This species is very similar to, and possibly identical with *C. variolosus* (Cuvier and Valenciennes) Günther, but the holotype has the anterior dorsal spines longer than is usual in that species.

Loc.—Cape York; holotype. Mr. Ogilby has very kindly re-examined the specimens which he recorded from Darnley Island, Torres Strait, as *Salarias alboapicalis*, and informs us that they are really *C. filamentosus*.

CIRRIPECTES ALBOAPICALIS, Ogilby.

(Plate iv., fig. 4.)

Salarias variolosus, Ogilby, Mem. Austr. Mus., ii., 1889, p. 62 (not *S. variolosus*, Cuvier and Valenciennes).

Salarias alboapicalis, Ogilby, Proc. Linn. Soc. N.S. Wales, xxiii., 1899, p. 742. *Id.*; Waite, Rec. Austr. Mus., v. 3, 1904, p. 224.

This species has been considered synonymous with *S. variolosus* (P. Cuvier and Valenciennes), Günther² but a comparison of seventeen specimens from Lord Howe Island, with six of *C. variolosus* from the New Hebrides, shows that they differ consistently in the following details:—

² Günther—Fische Südde, vi., 1877, p. 203, pl. cxvi., fig. a.

D. xi-xii/15-16; A. ii/16-17. Eleventh dorsal spine shorter than the post-orbital portion of the head; membrane of the last ray not reaching the caudal rays. *alboapicalis*.

D. xii/14-15; A. ii/15. Eleventh dorsal spine as long as the postorbital portion of the head; membrane of the last ray united with the base of the upper caudal ray *variolosus*.

In none of our specimens do we find D. xiii/19; A. 21, as counted by Ogilby, which counting is apparently incorrect.

Locs.—Specimens of *C. alboapicalis* are in the Australian Museum from Lord Howe Island and Kermadec Islands; two small examples from the latter locality have been recorded by Waite as *Salarias* sp.³ The specimens recorded as this species from Darnley Island, Torres Strait, by Ogilby, prove to be *C. filamentosus*, Alleyne and Macleay.

PETROSCIRTES, Rüppell.

Petroscirtes, Rüppell, Atl. Fische Reise Nordl. Afrika., 1828, p. 110 (*P. mitratus*, Rüppell).

Salarias deripiens, de Vis⁴ is apparently a species of *Petroscirtes*. It has canines in both jaws, the lower being very large and received into the upper jaw. Dorsal fin slightly emarginate, and no crest or tentacles on the head.

Salarias furcatus, de Vis⁵, is possibly also a *Petroscirtes*. It differs from *Salarias* in having the caudal fin deeply forked. Dorsal fin not notched; no occipital crest or ocular tentacles; canines present.

PETROSCIRTES VIPERIDENS, de Vis.

Salarias viperidens, de Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 697.

Cotypes of this species preserved in the Australian Museum, prove it to be a *Petroscirtes*.

PETROSCIRTES LUPUS, de Vis.

Salarias lupus, de Vis, Proc. Roy. Soc. Qld., ii., 1886, p. 58.

The holotype of this species is preserved in the Queensland Museum. It has lost all trace of its colour marking. D. 30; A. 20; V. 2; C. 11. It is a species of *Petroscirtes*.

ASPIDONTUS, Quoy and Gaimard.

Aspidontus, Quoy and Gaimard, Voy. "Astrolabe," iii., 1834, p. 719 (*A. taeniatus*, Quoy and Gaimard).

ASPIDONTUS MAROUBRAE, Ogilby.

Aspidontus maroubrae (Ogilby), McCulloch, Austr. Zool., i.4, 1917, p. 92, pl. x., fig. 1.

Two specimens, 40-42 mm. long, agree well with the holotype of the species in all details, but have the colour marking of the dorsal and anal fins darker and more sharply defined. The body is nearly uniform brown, with traces of darker cross-bands.

Locs.—New Hebrides; coll. Cummins and Stevens. The only other specimen hitherto recorded is the holotype, which was washed up on Maroubra Beach, near Sydney.

³ Waite—Trans N.Zeal. Inst., xlii, p. 380.

⁴ De Vis—Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 694.

⁵ De Vis—Ibid., p. 696.

LEPIDOBLENNIUS, *Steindachner*.

Lepidoblenius, Steindachner, Sitzb. Akad. Wiss. Wien, lv. i., 1867, p. 11 (*L. haplodactylus*, Steindachner).

Body rather elongate, covered with small or moderate sized scales, which may be wholly cycloid or largely ctenoid; lateral line curved downward to the middle of the body, formed of simple tubes on enlarged scales. Head naked, eyes large, snout conical, with an oblique profile. A broad patch of teeth in the front of the premaxillaries, the anterior ones largest, curved and subulate; mandible with similar but larger teeth, and some curved canines or subcaniniform teeth on the sides; a narrow curved band of teeth across the vomer. Dorsal fin commencing on the neck, with about 3/14-16 spines, the three anterior ones separated from the others; second dorsal with about twelve simple rays. Anal long, with about 21-23 rays. Pectoral well developed, with thick simple rays in the lower half. Ventrals jugular, with two thick and one slender ray. Caudal rounded. Gill-membranes forming a free fold across the isthmus, with six branchiostegals; pseudobranchiae present.

The inclusion of *Tripterygium marmoratum*, Macleay, in this genus necessitates the expansion of its characters relating to the squamation and dentition. The scales are wholly cycloid in *L. haplodactylus* and largely ctenoid in *T. marmoratum*, while the latter species has larger and more numerous teeth than the genotype. The two are so similar in all major characters, however, that they are evidently congeneric.

- a. Scales small, cycloid. Teeth smaller, the lateral premaxillary ones not extending much behind the level of the median patch; small caniniform teeth on sides of mandible.....*haplodactylus*.
 aa. Scales larger, ctenoid above, cycloid below. Teeth larger, lateral premaxillary ones extending well behind the level of the median patch; mandible with curved canines laterally.....*marmoratus*.

LEPIDOBLENNIUS HAPLODACTYLES, *Steindachner*.

Lepidoblenius haplodactylus, Steindachner, Sitzb. Akad. Wiss. Wien, lv. i., 1867, p. 12, pl. i., fig. 2-3. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62, and Zool. Rec., 1867 (1868), p. 165. *Id.*, Macleay, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 13. *Id.*, McCulloch, Proc. Linn. Soc. N.S. Wales, xl., 1915, p. 276.

Lepidoblenius geminatus, Macleay, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 13. *Id.*, Ogilby, Cat. Fish. N.S. Wales, 1886, p. 39. *Id.*, Waite, Mem. N.S. Wales Nat. Club, ii., 1904, p. 52.

The identity of *L. geminatus* and *L. haplodactylus* has already been noted by McCulloch. The holotype of Macleay's species agrees in all details with Steindachner's description and figure.

Hab.—Steindachner's type was said to have been obtained at Rockhampton, Queensland. Ogilby has recognised the species in Moreton Bay, and it extends southward to Port Jackson, where it is very common.

LEPIDOBLENNIUS MARMORATUS, *Macleay*.

Tripterygium marmoratum, Macleay, Proc. Linn. Soc. N.S. Wales, iii., 1878, p. 34, pl. iii., fig. 2, and vi., 1881, p. 26. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 389.

D. iii/xiv-xvi/11-12; A. 23; P. 14-16; V. 3; C. 13. Head 4 in the length to the hypural joint; depth of the head 5.1 in the same. Orbit 4

in the head, and 1.5 in the snout, which is 2.6 in the head. Interorbital width 3 in the orbit. Second dorsal spine 1.6 in the head, and subequal to most of the spines of the second dorsal and the anterior rays. Fourth last anal ray 2, median ventral ray 1.3, and caudal 1.1 in the head. Pectoral 0.2 longer than the head.

Head naked, much longer than high, with an obtusely pointed snout; anterior profile oblique. Eyes large, cutting the profile, and separated by a narrow concave interorbital space. A minute nasal tentacle. Mouth nearly horizontal, maxilla reaching to below the posterior portion of the eye; mandible shorter than the upper jaw. A band of villiform teeth in the front portion of the premaxillaries, the outer ones enlarged and subulate anteriorly, and extending backward well behind the villiform patch; a group of larger teeth on each side of the mandibular symphysis, the anterior ones large and subulate, and some spaced curved canines on the sides; about two rows of small teeth form a curved series across the vomer, palatines toothless. Tongue thick, obtusely pointed anteriorly, only the tip free. Gill-opening very wide, the exposed edge of the shoulder-girdle smooth.

Body elongate, covered with scales of moderate size which are ctenoid on the back and sides and cycloid towards the ventral surface; they extend forward to the nape before the dorsal fin, but leave the breast and abdomen naked. The lateral line curves downward from the shoulder to the middle of the body, and extends to the tail; it is formed of simple tubes placed on enlarged scales.

First dorsal spine inserted just behind the vertical of the preopercular margin; the first three spines are separated by an interspace from the succeeding ones, but are connected to them by membrane; the third is the longest. Spines of the second portion of the fin subequal in height to the third, decreasing a little posteriorly; the last is separated from the soft dorsal. Dorsal rays simple, highest anteriorly, the last not united with the peduncle by membrane. Anal commencing below the middle of the second dorsal, its rays simple and increasing in height to about the fourth last; their tips are curved and free. Pectorals large and pointed, reaching to above the sixth anal ray; the lower rays are thick and simple, the upper ones bifurcate. Ventrals with two thick rays and one thin one, the median ones reaching about two-thirds of their distance from the vent. Caudal subtruncate, with rounded angles, the rays bifurcate.

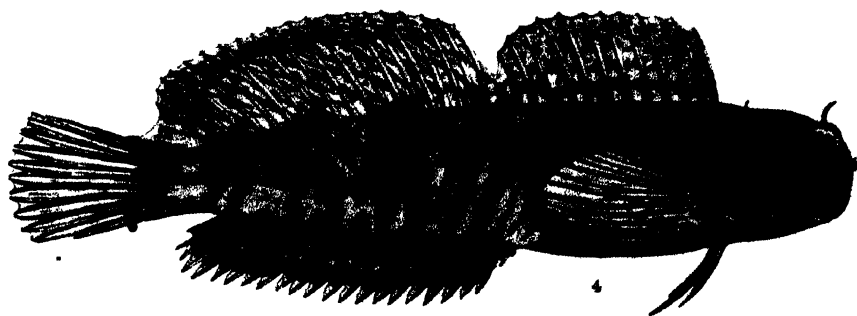
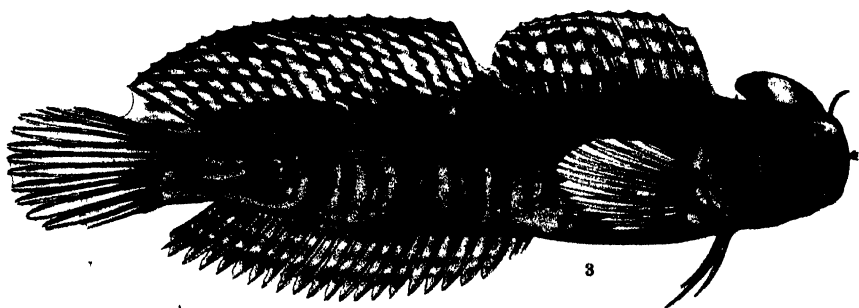
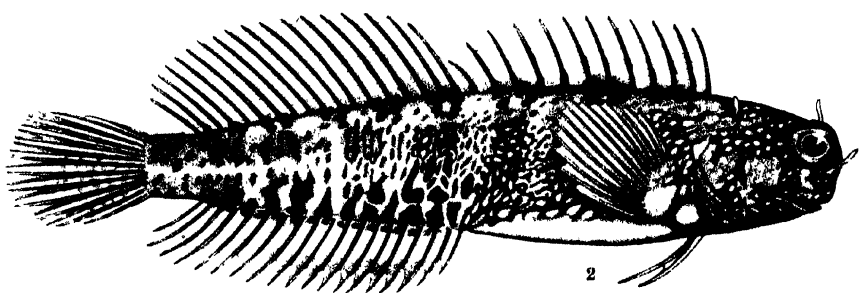
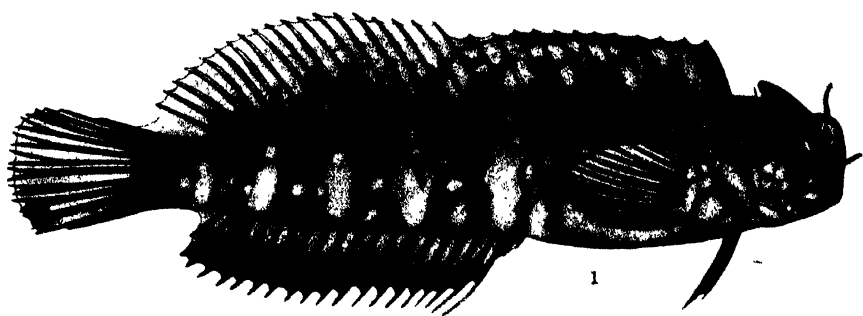
Colour marking.—Brown above, white below, with dark saddle-like markings on the back, from which blackish bars descend obliquely backwards. A broad dark-edged bar descends from the eye on each side of the snout, another covers most of the cheek, and a less distinct one crosses the operculum. Dorsal fins with rows of dark spots, which are most distinct on the rays. Caudal with irregular rows of brown spots. Anal obscurely spotted, with a dark submarginal band. Pectoral spotted, and with large dark markings on the basal portion.

Described from three cotypes, 101-118 mm. long, preserved in the Macleay Museum, which are in very bad condition. The proportions are those of the largest specimen.

Loc.—King George Sound, South-western Australia.

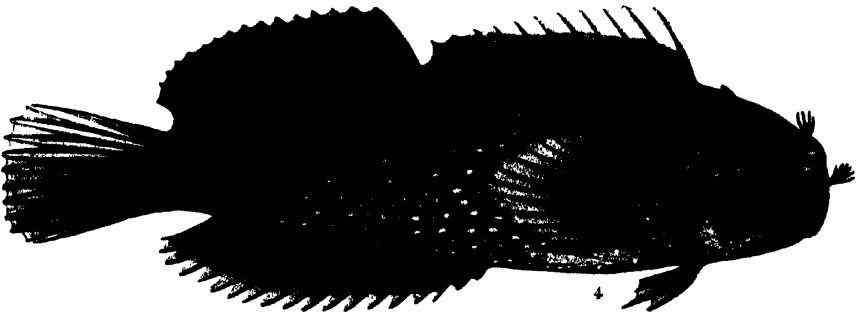
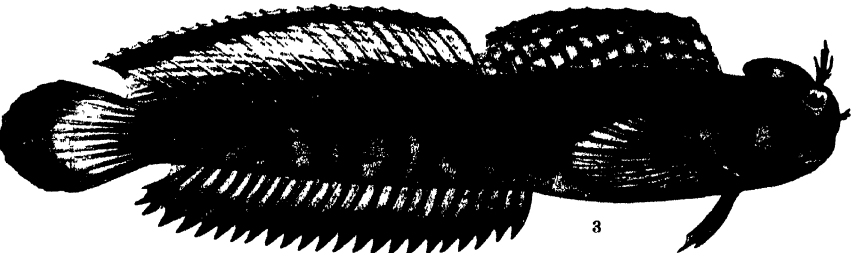
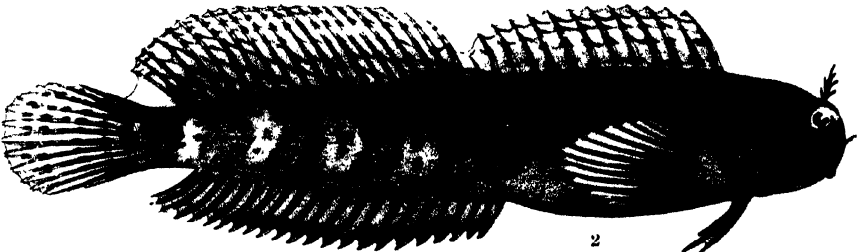
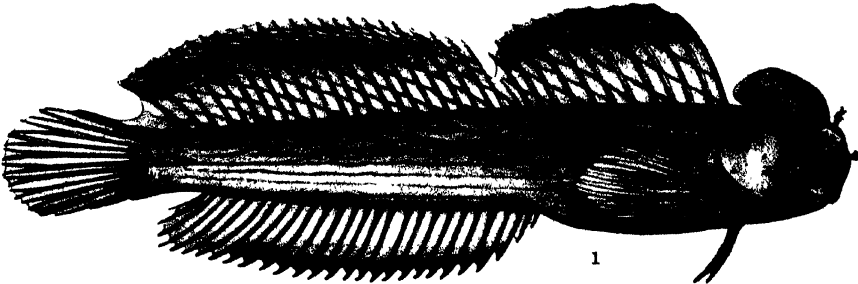
EXPLANATION OF PLATE III

- Fig. 1. *Salarias spaldingi*, Macleay. Cotype 76 mm long, from Port Darwin.
2. *Salarias irroratus*, Alleyne and Macleay. Cotype of *S. calvus*, de Vis, 55 mm long, from Murray Island, Torres Strait.
3. *Salarias rivulatus*, Ruppell. A male example 120 mm long, from Masthead Island, Queensland
4. *Salarias rivulatus*, Ruppell. A female example, 114 mm. long, from Masthead Island, Queensland



EXPLANATION OF PLATE IV.

- Fig. 1. *Salarias lineatus*, Cuvier and Valenciennes. A specimen 103 mm. long, from the New Hebrides.
2. *Salarias dussumieri*, Cuvier and Valenciennes. A specimen 94 mm. long, from Murray Island, Torres Strait.
3. *Salarias geminatus*, Alleyne and Macleay. A specimen 107 mm. long, from Murray Island, Torres Strait.
4. *Cirripectes alboapicalis*, Ogilby. A specimen 75 mm. long from Lord Howe Island.



DESCRIPTIONS OF TWO NEW HYDROIDS, AND A REVISION OF THE HYDROID-FAUNA OF LORD HOWE ISLAND

BY

E. A. BRIGGS, B.Sc., Zoologist, Australian Museum.

(Plates v.-vi.)

I.—DESCRIPTIONS OF THE NEW SPECIES.

Family PLUMULARIDÆ.

Genus AGLAOPHENIA, *Lamouroux*

AGLAOPHENIA HOWENSIS, *sp. nov.*

(Pl. v., fig. 1-2; Pl. vi., fig. 1.)

Trophosome.—Hydrocaulus monosiphonic, unbranched, simply pinnate, attaining a height of 6 cm. The stem is divided into regular internodes, separated by oblique nodes, which slope successively in opposite directions. Each internode bears a single hydrocladium. The hydrocladia are slender, alternate, close, both series nearly in one plane, and rising at an angle of about 35°-40°; nodes slightly oblique. The hydrocladia are divided into a series of regular internodes, each of which bears a solitary hydrotheca.

The hydrothecæ are borne nearly on the front of the hydrocladia. They are closely set, sub-cylindrical, with the axis of the hydrotheca lying away from the hydroclade at an angle of about 40°. There is a well-developed anterior intrathecal ridge proceeding from about the middle of the front of the cell and extending to about its centre, where it ends in a hammer-like thickening. There is in addition a small projection in front of the hydropore with a rounded median tooth, which is clearly a rudimentary posterior ridge. The hydropore is parallel with the hydrocladium, or nearly so, but raised above it. The border of the hydrotheca has a well-developed median anterior tooth, which is incurved, and four teeth on each side. The first pair of lateral teeth from the front are triangular, rounded at the apex, and strongly everted; the second pair, roughly rectangular in appearance, are bent inwards; the third pair are broad, rounded at the apex, and strongly everted; the fourth pair are narrow, pointed, and lie behind the lateral sarcothecæ. The back is adnate. The front of the hydrotheca is provided with an external longitudinal hollow chamber extending from the anterior intrathecal ridge, and terminating in an elevated pointed crest over the anterior marginal tooth. Hydrothecal internode without septal ridges.

The mesial sarcotheca is about half the length of the hydrotheca, and is adnate for about half its length, the free distal portion usually being directed more outward. The terminal and inferior apertures are completely confluent. A small septum runs across the cavity of the mesial sarcotheca. The lateral sarcothecæ are small, adnate up to the margin of the hydrotheca, and project slightly beyond it; the terminal and inferior apertures are confluent. There are three cauline sarcothecæ; two on the anterior surface of the rachis at the base of each hydrocladium, the distal anterior sarcotheca being similar to the laterals, but larger, or with two orifices bordering the free margin; while the proximal anterior sarcotheca is smaller, and almost oval in outline, with a solitary wide superior aperture. The third cauline sarcotheca is similar to the laterals in shape, but larger, and is situated at the back of each axil.

Gonosome.—The gonangial branch replaces a hydrocladium, and bears a single hydrotheca below the corbula. The corbulæ are long and cylindrical, and each consists of twelve to nineteen pairs of alternate ribs, springing from separate internodes of the rachis as narrow pinnules, but expanding above into broad leaflets, which unite to form a closed corbula, except for oblique openings between the bases of the leaflets left by the incomplete fusion of the latter in this region. Each leaflet bears a row of sarcothecæ along its distal edge; the proximal edge, however, is devoid of sarcothecæ.¹ A single sarcotheca—sometimes two—occurs on the rachis at the base of each leaflet.

Colour.—Light brown, stem darker.

Dimensions.—

Stem internode, length	0 24-0 28 mm
Stem internode, diameter	0 28-0 35 mm
Hydrocladium, length	up to 10 mm.
Hydroclade internode, length	0 22-0 24 mm
Hydrotheca, depth	0 18-0 19 mm
Hydrotheca, breadth at mouth ²	0 10-0 12 mm
Corbula, length	up to 6 mm.
Corbula, diameter	1 mm

Both Billard and Bale have drawn attention to the tendency exhibited by some species of *Agluophenia* to reversal of the front and back of the polypidom. I have observed this condition in *A. howensis*, in which four or five of the hydrocladia on each side alternately face the front and back throughout the length of the stem, with the result that no fewer than eighteen reversals occur in a length of 6 cm. As a consequence the stem, when viewed laterally, presents a very wavy appearance. Billard's explanation that reversals followed a regeneration of a broken part does not appear applicable in this instance, as I am unable to detect any break in the continuity of the stem. This change of front is not confined to the hydrocladia, but is shared also by the corbulæ. In *A. howensis* the gonangial branches replace the hydrocladia, and wherever a reversal of the latter occurs the corbulæ also face in the same direction.

Affinities.—*Agluophenia howensis* is very closely allied to *A. sinuosa*, Bale³, from Port Denison, Queensland. It differs, however, from Bale's species in the form and position of the posterior intrathecal ridge, which is quite rudimentary in *A. howensis*, but is well developed in *A. sinuosa*, in which species the hydropore is not elevated as in *A. howensis*. Other characters by which this species may be distinguished from *A. sinuosa* are (1) the smaller size of the hydrotheca (0.19 mm as against 0.31 mm. in depth); (2) the form and position of the lateral teeth on the margin of the hydrotheca, (3) the different configuration of the apocauline side of the hydrotheca with the mesial sarcotheca; (4) the presence on the front of the hydrotheca of a prominent external

¹ This is contrary to Nutting's observations on the structure of the corbulæ of American species of *Agluophenia*, in which there is always "a row of nematophores on the proximal or inner edges of each leaf, the nematophores projecting into the cavity of the corbula" (Nutting—American Hydroids, pt. I.,—Plumulariids, 1900 p. 88).

² Distance from posterior wall to anterior tooth.

³ Bale—Proc. Linn. Soc. N.S.Wales (2), iii, 1888, p. 790, pl. xxi., fig. 1, 2.

hollow chamber, which terminates in an elevated pointed crest over the anterior marginal tooth; and (5) the structure of the corbula, and the arrangement of the sarcothecæ on the leaflets.

Remarks.—Whitelegge⁴, in his list of Hydroids from Lord Howe Island, includes "*Halicornaria*, sp. nov.?", and specimens so labelled in the Australian Museum collection prove on examination to be identical with *Aglaopheniū howensis*. There is also preserved in the Macleay Museum a specimen of this species from an unknown locality, collected by the "Chevert" expedition. The itinerary of this expedition did not include Lord Howe Island, the "Chevert's" movements being confined to the Australian coast (the inner passage from Percy Island to Cape York), New Guinea, and Torres Straits.

Lor.—Middle Beach, Lord Howe Island, South Pacific Ocean. This specimen has been selected as the holotype.

Holotype.—In the Australian Museum, Sydney.

Genus *AGLAOPHENOPSIS*, *Fewkes*.

Aglaophenopsis, Fewkes, Bull. Mus. Comp. Zool., viii., 1881, p. 132. *Id.*, Nutting, American Hydroids, pt. I.,—Plumularidæ, 1900, p. 118.

The genus *Aglaophenopsis*, with *hiranta* for its type, was described by Fewkes in 1881 from specimens taken by the "Blake" Expedition. In 1900 Nutting added two new species, *A. (?) distans*, and *A. verrilli*, and also referred to this genus *Uadocarpus cornutus*, Verrill. The genus has hitherto been known only from North American waters. The occurrence in Australian seas of a fifth species is, therefore, particularly noteworthy. The bathymetrical distribution of the American species ranges from 200 to 1,497 fathoms. The Australian representative was dredged in 50 fathoms.

AGLAOPHENOPSIS VAGA, *sp. nov.*

(Pl. v., fig. 3-7; Pl. vi., fig. 2.)

Trophosome.—Hydrocaulus polysiphonic, branched, reaching a height of 16 cm. The hydrocladial tube is divided into regular internodes by distinct nodes. Each internode bears a single hydrocladium. The hydrocladia are slender, alternate, both series springing from the front of the hydrocladial tube and directed forwards; nodes slightly oblique. The hydrocladia are divided into a series of regular internodes, each of which bears a solitary hydrotheca.

The hydrothecæ are deep, oval in shape, narrowing towards the base, the axis of the hydrotheca lying almost parallel with the hydrocladium. There is a well-developed intrathecal ridge near the base, projecting from the adcauline wall, and reaching a little more than one-third across the cavity of the hydrotheca. The aperture of the hydrotheca is circular, and has a well-developed anterior tooth; the border is otherwise entire, smooth, or very faintly undulated. The back is adnate. The hydrothecal internode is provided with three septal ridges, one opposite the intrathecal ridge, another behind the lateral sarcothecæ, and a third near the base of the internode. Besides these a small septum generally runs across the cavity of the mesial sarcotheca.

⁴ Whitelegge in Etheridge—Mem. Austr. Mus., ii., 1889, p. 41.

The mesial sarcotheca is very nearly as long as the hydrotheca, and is closely adnate throughout its length. The aperture is simple and oblique, and has a slightly undulated margin. A small septum runs across the cavity of the mesial sarcotheca. The lateral sarcothecæ are adnate up to the hydrotheca-margin, the upper posterior corner attaining a level somewhat higher than that of the hydrotheca. They are saccate, roughly triangular in outline, with a broad, free margin, which never becomes tubular at the ends. On the hydrocladate tube there are three cauline sarcothecæ to each internode; one antero-lateral in position at the origin of the hydrocladium, another a little below this in the middle line on the anterior surface, both of which are similar to the lateral sarcothecæ, and a third similar to the laterals in shape—but smaller—is situated at the back of each axil. On each accessory tube the cauline sarcothecæ are small, numerous, and arranged in a single, evenly-spaced series along the whole length of the tube.

Gonosome.—The gonangia are borne singly on the branches at the bases of the hydrocladia. They are oblong-ovate, with a latero-terminal orifice. No stalk is present, and in frontal view they appear as much elongated (length three times maximum breadth) cylindrical bodies, with the aperture lying a little within the upper margin, and facing the observer. The aperture is pear-shaped, with its basal portion distinctly contracted. There is a slight pit-like depression situated immediately below the lower lip of the aperture. In lateral aspect the profile is obovate, with the summit curved over the latero-terminal orifice, which faces outwards and slightly downwards. The gonangia reach a length of 1.75 mm., with a maximum diameter of 0.59 mm., about the proximal third of their length.

Each gonangium is protected by a jointed, unbranched appendage, springing from the proximal internode of the hydrocladium, and bearing a single row of sarcothecæ, and one or two terminal hydrothecæ. Each protective appendage originates from one side of the hydrocladium just below the hydrotheca, and is divided by oblique nodes into a series (up to seven in number) of regular internodes. Each internode is short, and bears a solitary sarcotheca, with the exception of one or two of the distal internodes, which are longer and provided with hydrothecæ. The sarcothecæ are similar to the lateral sarcothecæ of the hydrotheca.

Colour.—Buff.

Dimensions.—

Hydrocladate tube internode, length	..	...	0.80-0.89 mm.
Hydrocladate tube internode, diameter	..	..	0.29-0.35 mm.
Hydrocladium, length	...	...	up to 8 mm.
Hydroclade internode, length	..	...	0.59-0.63 mm.
Hydroclade internode, diameter	...	...	0.17-0.21 mm.
Hydroclade proximal internode, length	...	...	0.87-0.89 mm.
Hydrotheca, depth	...	...	0.42-0.43 mm.
Hydrotheca, breadth at mouth (lateral aspect)	...	...	0.28-0.29 mm.
Gonangium, length	...	...	1.75 mm.
Gonangium, maximum diameter	...	...	0.59 mm.
Phylactogonium, length	...	...	up to 4 mm.
Phylactogonium internode (with sarcotheca), length	...	...	0.36-0.43 mm.
Phylactogonium internode (with hydrotheca), length	...	...	0.70-0.75 mm.

The colony, 16 cm. in height, consists of a main stem, 3 mm. in diameter, which is destitute of hydrocladia. The basal portion of the stem is missing. At a height of 5.5 cm. branching begins, the largest primary branch having a diameter at the base of 3 mm., and a length of 12 cm. The secondary branches, up to 8 cm. in length, are abundant and irregularly arranged, varying in position from alternate, through sub-alternate to opposite. A few small branches of the third order also occur. The stem, branches, and branchlets are all strongly fascicled. In transverse section the stem is seen to be made up of a great number of tubes—as many as fifty-seven being counted. The polysiphonic branches and branchlets consist of a hydrocladial tube, supported by a varying number of accessory tubes. The hydrocladial tube runs along the surface of the branches, but in the stem it loses its superficial position, and, becoming immersed in the accessory tubes, occupies a central or axial position. The hydrocladial tube is alone divided into internodes, which are separated by distinct nodes. About the middle of each internode is a process upon which a hydrocladium is set. The hydrocladia arise alternately from the hydrocladial tube, and reach a length of 8 mm. Each hydrocladium commences with a long proximal internode separated from the tube process by a transverse node, and from the next succeeding hydroclade internode, by an articulation, very oblique in lateral view, and resembling from the front two cones, the points of which interpenetrate. The remaining internodes are considerably shorter than the proximal one, and are separated by slightly oblique nodes.

The gonangia are borne singly on the branches at the bases of the hydrocladia, and not on the phylactogonia as in *A. verrilli*, Nutting.

In his introductory remarks on the structures for the protection of the gonangia and their contents among the Plumularidæ, Nutting⁵ states that "in *Aglaophenopsis* the phylactogonium is supposed to be a greatly reduced mesial nematophore of the proximal hydrotheca." In *A. vuga* the phylactogonium does not occupy the place of a mesial sarcotheca, but springs from one side of the proximal internode of the hydrocladium, originating from that part of the internode, which is between the node and the base of the hydrotheca. The phylactogonium apparently intrudes between the mesial sarcotheca and the base of the hydrotheca, since the sarcotheca is there, but, as it were, forced out of its natural position. It is true that this sarcotheca does not represent the ordinary type of mesial sarcotheca; it is not in contact with the hydrotheca, and is much wider and similar in size and shape to the cauline sarcothecæ on the hydrocladial tube. It is doubtful whether the phylactogonium is a modified mesial sarcotheca, either in my specimen or in the American species, and Nutting also seems dubious, as is evident from his remark "it is impracticable to insist in all cases on such homologies."

The phylactogonium is a jointed, unbranched appendage, bearing a single row of sarcothecæ, and one or two terminal hydrothecæ. According to Nutting, this type of protective appendage is "unique among the Statopora, and if consistent would prove an excellent generic character." In *A. vuga* either one or two terminal hydrothecæ are present. Both

⁵ Nutting—American Hydroids, pt. I.,—Plumularidæ, 1900, p. 35.

hydrothecæ may be quite normal in appearance, or the proximal one may have the ordinary mesial sarcotheca wanting, and a sarcotheca similar to the cauline sarcotheca of the hydrocladate tube present on the internode below the hydrotheca. The arrangement of the sarcothecæ on the protective appendage is very uniform, each internode being armed with a single sarcotheca, except for one or two instances when two sarcothecæ were observed on a single internode.

Affinities.—The present specimen has been referred to the genus *Agluophenopsis*, on account of the phylactogonium, which is a jointed, unbranched appendage springing from the proximal internode of the hydrocladium, and bearing a single row of sarcothecæ, and one or two terminal hydrothecæ. Plumularians of this type have hitherto been recorded only from North American waters, where they are represented by four species. The discovery of a fifth species on the coast of New South Wales is, therefore, of great interest. The species is a well-marked one, and differs considerably from the previously-described members of the genus. It is readily distinguished from *A. hirsuta* by its single mesial sarcotheca; from *A. distans* and *A. verrilli* by its large mesial sarcotheca, which is adnate to the front of the hydrotheca; and from *A. cornuta* by the front of the hydrotheca, which is without a ridge or keel.

Loc.—Off Botany Bay, New South Wales, 50 fathoms.

Holotype.—In the Australian Museum, Sydney.

Key to the species of the genus *Agluophenopsis*:—

- a. Mesial sarcotheca single.
 - b. Mesial sarcotheca small, separate from hydrotheca.
 - c. Margin of hydrotheca with a prominent anterior tooth; lateral teeth shallow or sinuous *A. distans*.
 - cc. Margin of hydrotheca without a prominent anterior tooth; lateral teeth subequal *A. verrilli*.
 - bb. Mesial sarcotheca large, adnate to hydrotheca.
 - d. Front of hydrotheca with a prominent ridge or keel *A. cornuta*.
 - dd. Front of hydrotheca without a ridge or keel *A. uaga*.
- aa. Mesial sarcotheca double *A. hirsuta*.

II.—REVISION OF THE HYDROID-FAUNA OF LORD HOWE ISLAND.

Hydroid Zoophytes were present in the collections made at Lord Howe Island in August-September, 1887, by a collecting party despatched by the Trustees of the Australian Museum to this isolated Island. Lord Howe Island is situated in S. Lat. 31° 33', and E. Long. 159° 5'. It is the most southern of the outlying islands on the east coast of Australia.

The determination and description of these collections was effected by the Museum staff, and Mr. T. Whitelegge⁶ prepared a short account of the Coelenterata, which included a list of Hydroids collected chiefly from seaweeds thrown up on the sandy beach of the lagoon. The Hydroids mentioned in this list, with their identification as now understood, are as follows:—

- Ceratella fusca*, Gray? ... *Solanderia fusca* (Gray).
- Sertularella solidula*, Bale ... *Sertularella indivisa*, Bale.
- Eucopella campanula*, Lendfel. ... *Silicularia campanularia* (Lendenfeld).

⁶ Whitelegge in Etheridge—Mem. Austr. Mus., ii., 1889, p. 41.

<i>Sertularia minima</i> , Thompson	..	<i>Sertularia minima</i> , Thompson.
<i>Halicornaria</i> , sp. nov. ?	...	.. <i>Aglaophenia howensis</i> , Briggs.
<i>Halicornaria</i> , sp. nov. ?	..	.. <i>Thecocarpus brevirostris</i> (Busk).
<i>Plumularia</i> , sp. nov. ?	..	.. <i>Plumularia balei</i> , Bartlett.
<i>Plumularia spinosa</i> , Bale	..	.. <i>Plumularia spinulosa</i> , Bale.
<i>Campanularia tineta</i> , Hincks		<i>Campanularia tineta</i> , Hincks.

Whitelegge's list is of interest as being the first contribution to the study of the Hydroid Zoophytes of Lord Howe Island, although no serious work was attempted on the specimens with the exception of those of *Solanderia fusca* (Gray), which were fully described and figured by Prof. Baldwin Spencer⁷.

During a visit to the island in November, 1913, I collected a number of Hydroids, and these, in conjunction with Whitelegge's specimens, form the basis of the present paper. Although the collection is a small one, consisting of twenty species belonging to twelve genera, it forms a useful addition to our very meagre knowledge of the Hydroid fauna of this island. The collection, moreover, shows the relationship which the Hydroids bear to those of neighbouring seas. Nineteen of the twenty species here recorded have previously been recognised from the Australian coast. On the other hand, only two species are common to the Kermadec Islands and Lord Howe Island. Considering the zoo-geographical relationships of these two islands, the lack of similarity in their respective Hydroid faunas is very striking, especially as Hilgendorf⁸ has recorded eight species from the Kermadecs, and I have been able to examine—through the kindness of Mr. W. R. B. Oliver, of Auckland, New Zealand—a number of additional forms from the same locality, as well as duplicates of Hilgendorf's specimens. Of the eight species recorded by Hilgendorf, only one (*Sertularia minima*, Thompson) is common to the two islands; and, with additional material at my disposal, I have only been able to add a second species, *Thecocarpus brevirostris* (Busk), from Sunday Island, Kermadecs. The same species appears in Whitelegge's list as "*Halicornaria*, sp. nov. ?"

In an addendum I have been able to assign to their correct positions Hilgendorf's *Aglaophenia* ? x and *Aglaophenia* ? y, from Denham Bay, Sunday Island, Kermadec Islands.

The complete list of the species in the collection from Lord Howe Island is as follows:—

Family SOLANDERIDÆ.

Solanderia fusca (Gray).

Family CAMPANULARIDÆ.

Campanularia tineta, Hincks.

Silicularia campanularia (Lendenfeld).

Family LAFOEIDÆ.

Hebella calcarata (L. Agassiz), var. *contorta*, Marktanner-Turneretscher.

⁷ Spencer—Trans. Roy. Soc. Vict., ii., 2, 1891, pp. 8-24, pl. ii., fig. 1-3a, pl. iii., fig. 4-8, pl. iii., fig. 9-14.

⁸ Hilgendorf—Trans. N.Z. Inst., xliii., 1910 (1911), pp. 540-543.

Family SERTULARIDÆ.

Sertularella indivisa, Bale.

Sertularella subarticulata (Coughtray).

Sertularia bispinosa (Gray).

Sertularia minima, Thompson.

Thuiaria sinuosa, Bale.

Thuiaria tubuliformis (Marktanner-Turneretscher).

Pasythea quadridentata (Ellis and Solander), var. *obliqua*, Lamouroux.

Family PLUMULARIDÆ.

Plumularia balei, Bartlett.

Plumularia buskii, Bale.

Plumularia spinulosa, Bale.

Halicormaria ascidionides (Bale).

Halicormaria prolifera (Bale).

Aglaophenia divaricata (Busk).

Aglaophenia howensis, Briggs.

Aglaophenia parvula, Bale.

Thecocarpos brevirostris (Busk).

Family SOLANDERIDÆ.

Genus SOLANDERIA, *Duchassaing and Michelin*.

Solanderia, Duchassaing and Michelin, *Revue Zoologique*, 1846, p. 219.

Ceratella, Gray, *Proc. Zool. Soc.*, 1868, p. 579.

Stechow, who has examined the type of *Solanderia gracilis*, has shown that the genus *Ceratella* should be suppressed, being synonymous with *Solanderia*.

SOLANDERIA FUSCA (Gray).

Ceratella fusca, Gray, *Proc. Zool. Soc.*, 1868, p. 579, fig. 2. *Id.*, Carter, *Ann. Mag. Nat. Hist.* (4), xi., 1873, pp. 8, 10. *Id.*, Bale, *Cat. Austr. Hydroid Zoophytes*, 1884, p. 48. *Id.*, Lendenfeld, *Proc. Linn. Soc. N.S. Wales*, ix., 1885, p. 612. *Id.*, Brazier, *Ibid.* (2), i., 1886, p. 575. *Id.*, Bale, *Ibid.* (2), iii., 1888, p. 748. *Id.*, Spencer, *Trans. Roy. Soc. Vict.*, ii., 2, 1891, pp. 8-24, pl. ii., fig. 1-3a; pl. iii., fig. 4-8; pl. iiiia., fig. 9-14. *Id.*, Nutting, *Bull. U.S. Fish. Comm.*, xxiii., 3, 1906, p. 939.

Among the specimens of *Solanderia fusca* (Gray), preserved in the Australian Museum, are several colonies which were collected by Whitelegge at Lord Howe Island. These were submitted to Prof. Sir Baldwin Spencer, and were fully described and figured in his paper "On the Structure of *Ceratella fusca* (Gray)," which appeared in 1891.

Distribution.—Previously recorded from New South Wales (Gray, *Brazier*); Lord Howe Island (Spencer); Flinders Island, Bass Strait (Spencer); North coast of the Island of Maui, Hawaiian Islands (Nutting).

Family CAMPANULARIDÆ.

Genus CAMPANULARIA, Lamarck.

CAMPANULARIA TINCTA, Hincks.

Campanularia tinctoria, Hincks, Ann. Mag. Nat. Hist. (3), vii., 1861, p. 280, pl. xii. *Id.*, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 57, pl. i., fig. 4-6; pl. xix., fig. 29. *Id.*, Jäderholm, Wissensch. Ergeb. schwedischen Südpolar-Exped., Bd. v., Zool. i., Hydroiden, 1905, p. 14, pl. v., fig. 5. *Id.*, Warren, Ann. Natal Govt. Mus., i., 3, 1908, p. 337, fig. 18. *Id.*, Vanhöffen, Deutsche Südpolar-Exped., Bd. xi., Zool. iii., Hydroiden, 1910, p. 296, fig. 17. *Id.*, Ritchie, Mem. Austr. Mus., iv., 16, 1911, p. 814. *Id.*, Nutting, American Hydroids, pt. iii., Campanularidæ and Bonnevillidæ, 1915, p. 41, pl. iv., fig. 6, 7.

Specimens of this species were observed on seaweeds thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Port Phillip (Hincks), and Portland, Victoria (Bale); Falkland Islands (Jäderholm, Ritchie); Straits of Magellan (Hartlaub); Natal (Warren); Gauss-Station, Antarctica (Vanhöffen); New South Wales (Ritchie).

Genus SILICULARIA, Meyen.

SILICULARIA CAMPANULARIA (Lendenfeld).

Eucopella campanularia (in part), Lendenfeld, Zeitschr. für Wiss. Zool., xxxviii., 1883, pp. 497-583, pl. xxix., fig. 15, D1-D $\frac{1}{2}$.

Eucopella campanularia, Bale (part), Proc. Linn. Soc. N.S. Wales (2), iii., 1888, p. 751. *Id.*, Mulder and Trebilcock, Geelong Naturalist (2), vi., 1, 1914, p. 9, pl. ii., fig. 8-11.

† *Eucopella reticulata*, Hartlaub, Zool. Jahrb., Suppl. vi., iii., 1905, p. 569, fig. R $\frac{1}{2}$.

Silicularia campanularia, Bale, Proc. Roy. Soc. Vict. (n.s.), xxvii., 1, 1914, p. 84, pl. xiii., fig. 1, 5.

Typical specimens of this species were found on seaweeds thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Victoria (Lendenfeld, Mulder and Trebilcock); New South Wales (Bale, Marktanner-Turneretscher); Port William, Falkland Islands (Hartlaub, as *Eucopella reticulata*).

Family LAFOEIDÆ.

Genus HEBELLA, Allman.

HEBELLA CALCARATA (L. Agassiz),

var. CONTORTA, Marktanner-Turneretscher.

Hebella contorta, Marktanner-Turneretscher, Ann. K. K. Hofmus. Wien, v., 1890, p. 215, pl. iii., fig. 17a, b. *Id.*, Campenhausen, Abh. Senckenb. Naturf. Ges. Frankfurt-a-M., 1897, p. 307. *Id.*, Levinson, Vidensk. Medd. fra den naturh. Foren, 64, 1913, p. 285, pl. v., fig. 16, 17.

Hebella cylindrica (in part), Pietet, Rev. Suisse de Zool., i., 1893, p. 41.

Hebella scandens (in part), Bale, Proc. Roy. Soc. Vict. (n.s.), xxvi., 1913, p. 117.

Hebella calcarata (L. Agassiz), var. *contorta*, Bale, Biol. Res. "Endeavour," iii., 5, 1915, p. 253.

Loc.—Growing on *Pasytheu quadridentata* (Ellis and Solander), var. *obliqua*, Lamouroux, thrown up on the sandy beach of the lagoon, Lord Howe Island.

Family SERTULARIDÆ.

Genus SERTULARELLA, Gray.

SERTULARELLA INDIVISA, Bale.

Sertularella indivisa, Bale, Biol. Res. "Endeavour," iii., 5, 1915, p. 285 (synonymy).

Numerous specimens of this small species were obtained which do not exceed 10 mm. in height. Some of the specimens give rise to one or two pinnately-disposed branches. Gonangia are present on several of the colonies.

Remarks.—This species appears in Whitelegge's list as *S. solidula*, Bale. Owing to the extreme range of variation exhibited by the forms distinguished as *S. indivisa*, *S. solidula*, and *S. variabilis*, all three are now generally regarded as a single variable species; this must be known as *S. indivisa*, which name appears first in the publication.

Loc.—Growing on seaweeds thrown up on the sandy beach of the lagoon, Lord Howe Island.

SERTULARELLA SUBARTICULATA (Coughtrey).

Thuiaria articulata, Hutton, Trans. N.Z. Inst., v., 1872, p. 258 (not *Thuiaria articulata*, Johnston).

Thuiaria subarticulata, Coughtrey, Trans. N.Z. Inst., vii., 1874, p. 287, pl. xx., fig. 32-34. *Id.*, Thompson, Ann. Mag. Nat. Hist. (5), iii., 1879, p. 110.

Thuiaria bidens, Allman, Journ. Linn. Soc., Zool., xii., 1876, p. 269, pl. xviii., fig. 1, 2.

Sertularia fertilis, Lendenfeld, Proc. Linn. Soc. N.S.Wales, ix., 1885, p. 406, pl. vii., fig. 4, 5.

A single dried colony, 9 cm. in height, representing this typical New Zealand species, agrees with the specimens described and figured by Allman under the name of *Thuiaria bidens*, which is synonymous with *S. subarticulata* (Coughtrey).

Loc.—Lord Howe Island.

Distribution.—Previously recorded from New Zealand (Hutton; Coughtrey; Allman, as *Thuiaria bidens*; Lendenfeld, as *Sertularia fertilis*). Whitelegge⁹ has recorded this species from Maroubra Bay, New South Wales.

⁹ Whitelegge—Proc. Roy. Soc. N.S.Wales, xxiii., 1889, p. 193.

Genus SERTULARIA, *Linnaeus*.SERTULARIA BISPINOSA (*Gray*).

Sertularia bispinosa (*Gray*), *Nutting, American Hydroids*, pt. II.,—*Sertulariidae*, 1904, p. 56, pl. ii., fig. 8-11 (synonymy).

A few fragmentary but typical examples of this species were found entangled with *Sertularella subarticulata* (*Coughtrey*). Gonangia are present on several of the specimens.

Dimensions.—

Stem internode, length	0.50-0.66 mm.
Stem internode, diameter at base of hydrotheca ...	0.26-0.31 mm.
Hydrotheca, length of external profile ...	0.38-0.43 mm.
Hydrotheca, length of free portion ...	0.28-0.33 mm.
Hydrotheca, length of adnate portion ...	0.17-0.19 mm.
Hydrotheca, diameter at mouth ...	0.14-0.15 mm.
Gonangium, length	up to 2 mm.
Gonangium, maximum diameter	up to 1.5 mm.

Remark.—*Levinson*¹⁰, in his "Systematic Studies on the Sertulariidae," refers *Sertularia bispinosa* (*Gray*) to his new genus *Odontotheca*.

Loc.—Lord Howe Island. Entangled with *Sertularella subarticulata* (*Coughtrey*).

Distribution.—Previously recorded from New Zealand (*Gray, Hutton, Lendenfeld*); Brighton, South Australia; Bass Strait? (*Bale*); Victoria (*Lendenfeld, Bale, Mulder and Trebilcock*); Indian Ocean (*Marktanner-Turneretscher*); East coast of South America (*Nutting*).

SERTULARIA MINIMA, *Thompson*.

Sertularia minima, *Bale, Biol. Res. "Endeavour,"* iii., 5, 1915, p. 269 (synonymy).

Many small colonies belonging to this widely-distributed species, and averaging 2-3 mm. in height, occur creeping over the fronds of seaweeds. The minute characters of the trophosome are quite typical. The transverse markings in the hydrorhiza in the form of perisarcal thickenings are well developed.

*Mulder and Trebilcock*¹¹ have drawn attention to the presence of two small external apertures at the base of the chamber ("infrathecal chamber") below each pair of hydrothecae. These apertures are small, circular holes from which short, fragile tubes protrude. I have not been able to detect on my specimens the presence of these apertures, which *Mulder and Trebilcock* found on their specimens from the Victorian coast. These writers, however, point out that in typical specimens "the tubes are nearly always absent . . . and the apertures small and difficult to detect. Sometimes they are missing altogether." In the case of typical specimens from Port Phillip, Victoria, *Bale* found very few of these orifices. An examination of *Ritchie's* specimens of *S. minima* obtained by the "Thetis" on the coast of New South Wales reveals the presence of these orifices on several of the internodes.

¹⁰ *Levinson*—*Vidensk. Medd. fra den naturh. Foren.*, 64, 1913, pp. 278, 308.

¹¹ *Mulder and Trebilcock*—*Geelong Naturalist*, vi., 2, 1914, p. 39.

Gonosome.—Gonangia are present on several of the colonies. The aperture of each gonangium is provided with a narrow denticulated collar.

Dimensions.—

Total height	... ..	up to 3 mm.
Stem internode, length	... ..	0.81-0.88 mm.
Stem internode, diameter at base of hydrotheca	... ..	0.10-0.12 mm.
Hydrotheca, length of external profile	... ..	0.24-0.27 mm.
Hydrotheca, length of free portion	... ..	0.14-0.15 mm.
Hydrotheca, length of adnate portion	... ..	0.19-0.21 mm.
Hydrotheca, diameter at mouth	... ..	0.07-0.08 mm.
Gonangium, length	... ..	1.09-1.20 mm.
Gonangium, maximum diameter	... ..	0.87-0.88 mm.

Loc.—Growing on seaweeds thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from New Zealand (Coughtrey); Cape of Good Hope (Allman); St. Vincent Gulf, Adelaide (Thompson); Victoria (Bale, Mulder and Trebilcock); New South Wales (Marktanner-Turneretscher, Ritchie); Port William, Falkland Islands (Jäderholm); Suez (Thornely); Denham Bay, Sunday Island, Kermadecs (Hilgendorf); Southern Chili, Fitzroy Canal (Jäderholm); Nuyts Archipelago, Great Australian Bight (Bale).

Genus *THUIARIA*, *Fleming*.

THUIARIA SINUOSA, *Bale*.

Thuiaria sinuosa, Bale, Biol. Res. "Endeavour," iii., 5, 1915, p. 279 (references).

The curvature of the hydrothecæ is not so pronounced as in the type, but otherwise the specimen agrees with Bale's description and figures. Gonangia are present on the pinnae.

Loc.—Middle Beach, Lord Howe Island.

Distribution.—Previously recorded from Port Molle, Queensland (Bale); Jervis Bay and Shoalhaven Bight, New South Wales (Ritchie, Bale); Queenscliff (?), Victoria (Mulder and Trebilcock); Seven miles east of Cape Pillar, Tasmania, 100 fathoms (Briggs); Great Australian Bight, 100 fathoms (Bale).

THUIARIA TUBULIFORMIS (*Marktanner-Turneretscher*).

Dynamena tubuliformis, Marktanner-Turneretscher, Ann. K.K. Hofmus. Wien, v., 1890, p. 238, pl. iv., fig. 10.

Thujaria tubuliformis, Billard, Bull. Mus. Histoire Naturelle, x., 1904, p. 482.

Thuiaria tubuliformis, Nutting, American Hydroids, pt. II.,—Sertularidæ. 1904, p. 70, pl. xi., figs. 1-8. *Id.*, Clarke, Mem. Mus. Comp. Zool. Harvard, xxxv., 1907, p. 14, pl. ix., figs. 1-5. *Id.*, Billard, Bull. Mus. Histoire Naturelle, xiii., 1907, p. 275. *Id.*, Warren, Ann. Natal Govt. Mus., i., 3, 1908, p. 314, fig. 12. *Id.*, Thornely, Journ. Linn. Soc., xxxi., 1908, p. 83. *Id.*, Ritchie, Proc. Zool. Soc., 1910, p. 832.

Sertularia vegæ, Pictet, Rev. Suisse de Zool., i., 1893, p. 44, pl. ii., figs. 37-38 (not *Thuiaria vegæ*, Thompson).

Many specimens of this species, the largest 25 mm. in height, were obtained. The structural details agree more closely with Warren's figures of *Natal* specimens than with those by Marktanner-Turneretscher and Nutting. In this respect the specimens differ from those recorded by Ritchie from the East Indian Ocean. The characters agree in detail with Warren's description, except that the hydrothecæ only very seldom show a tendency to arrange themselves in groups towards the distal ends of the branches. As in Clarke's Perico Island specimens, some of the stem internodes bear a branch and three hydrothecæ on one side, and two hydrothecæ on the other. In rare cases opposite instead of alternate branches arise from the proximal stem-internode. *Gonosome* not present.

Dimensions.—

Height of colony	up to 25 mm.
Typical stem internode, length	1.51 mm.
Stem internode, diameter	0.21-0.31 mm.
Branch, length	up to 10 mm.
Hydrotheca, length of adnate portion	0.43-0.47 mm.
Hydrotheca, length of free portion	0.14-0.17 mm.
Hydrotheca, diameter	0.14-0.15 mm.

Synonymy.—Pictet has ranked *Dynamena tubuliformis*, Marktanner-Turneretscher, as a synonym of *Thyridaria vega*, Thompson. The two species, however, are quite distinct, as is shown by their different gonangia. Pictet, moreover, has referred to *T. vega* specimens from Amboyne, which clearly belong to *T. tubuliformis*; his description and figures of them agree exactly with *T. tubuliformis*, and the dimensions correspond with those given by Marktanner-Turneretscher.

Remarks.—The range of this species must now be extended to include the eastern coast of Australia, as I have recently collected numerous specimens on the Great Barrier Reef, about the latitude of Cooktown, where it appears to be the most frequently-occurring Hydroid on the reefs. I have also examined specimens from Caloundra, Queensland, and from Nelson's Bay, Port Stephens, New South Wales.

Loc.—Middle Beach, Lord Howe Island. Common under stones.

Distribution—Previously recorded from Aschidda, Red Sea (Marktanner-Turneretscher); Amboyne, East Indies (Pictet, as *Sertularia vega*); Gulf of Tadjourah (Billard); Bay of Bahia, Brazil; Florida, between Salt Pond and Stock Island; Bahama Banks, 3-6 fathoms (Nutting); Perico Island, Gulf of Panama (Clarke); St. Thomas Island, Atlantic Ocean (Billard); Isipingo, Scottburgh, Park Rynie, Natal (Warren); Suez Bay, 10 fathoms (Thornely); Flying-Fish Cove, Christmas Island, Indian Ocean (Ritchie).

Genus *PASYTHEA*, Lamouroux.

PASYTHEA QUADRIDENTATA (Ellis and Solander),

var. *OBLIQUA*, Lamouroux.

Dynamena obliqua, Lamouroux, Hist. Polyp. Cor. Flex., 1816, p. 179.
Pasythea quadridentata, Bale, Proc. Linn. Soc. N.S. Wales (2), iii., 1888, p. 770 (part), pl. xiv., fig. 6.

Pasythea quadridentata (Ellis and Solander), var. *balei*, Billard, Arch. de Zool. exp. et gén. (4), vii., 1907, p. 335, fig. vi. A, B. *Id.*, Billard, Ann. Sci. Nat., Zool. (9), ix., 1909, p. 321.

Growing upon the surface of a seaweed are numerous colonies which do not exceed 6 mm. in height. Typical specimens of *Pasythea quadridentata* have the hydrothecæ in sets of one, two, or three pairs, each pair in contact with those above and below in the same set. In the specimens which I have referred to *Pasythea quadridentata*, var. *obliqua*, the majority of the internodes bear only a single pair of hydrothecæ each. In this respect the colonies do not differ from a typical *Sertularia*, and thus constitute an intermediate link between the typical *Pasythea* and the true *Sertularia*. Some of the specimens have the same disposition of the hydrothecæ on the proximal part of the stem, while at the distal extremity the hydrothecæ on the last two internodes are grouped in sets of two each, as in typical specimens of *Pasythea quadridentata*.

The present specimens also differ from the typical form in that the apertures of the hydrothecæ are directed more to the front and have blunter teeth than in the type, and the joints between the internodes are in some cases simple and inconspicuous, while in others the base of the upper internode runs down into a point in front, and the top of the lower one is produced upwards into a similar point at the back. A similar articulation separates the basal portion, which is destitute of hydrothecæ, from the remainder of the colony.

The specimens thus agree most closely with those described and figured by Billard¹² from Mozambique under the name of *Pasythea quadridentata*, var. *balei*, and with Bale's figure¹³ (pl. xiv., fig. 6) of a colony from Bondi, New South Wales.

The transverse markings in the hydrorhiza, referred to by Warren in his description of Natal specimens of *Pasythea quadridentata*, are well developed in the present colonies. These markings are very similar to those which occur in *Sertularia minima*, in the form of ribs of chitin running vertically up the sides of the hydrorhizal tubes at irregular intervals, and projecting across the cavity of the tube for about a quarter of its breadth. Warren has suggested that the occurrence of this structure may be of specific value, but Ritchie has recorded its presence in such widely-separated species as *Podocoryne echinata*, *Sertularia heterodonta*, and *Plumularia lagenifera*, var. *septifera*.

Dimensions.—

Height of colony	up to 6 mm.
Stem internode, length	0.40-0.49 mm.
Stem internode, diameter	0.12-0.19 mm.
Hydrotheca, length of external profile	0.28-0.29 mm.
Hydrotheca, length free	0.15-0.19 mm.
Hydrotheca, length adnate	0.23-0.24 mm.
Hydrotheca, diameter at mouth	0.10-0.12 mm.
Hydrotheca, diameter at base	0.11-0.12 mm.
Distance between two pairs of hydrothecæ	0.14-0.31 mm.

¹² Billard—Arch. de Zool. exp. et gén. (4), vii., 1907, p. 335, fig. 6.

¹³ Bale—Proc. Linn. Soc. N.S.Wales (2), iii., 1888, p. 770, pl. xiv., fig. 6.

Nomenclature.—*Dynamena obliqua*, Lamouroux, is said by Billard, who has examined the type, to be identical with the variety described by him in 1907 as *Pasythea quadridentata*, var. *balei*. I, therefore, use Lamouroux' name for this variety.

Loc.—Growing on a seaweed thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—This variety has hitherto been recorded only from the following localities:—Australia (Lamouroux); Bondi, New South Wales (Bale); Mozambique (Billard).

Family PLUMULARIDÆ.

Genus PLUMULARIA, Lamarck.

PLUMULARIA BALEI, Bartlett.

(Plate v., figs. 8-10.)

Plumularia balei, Bartlett, Geelong Naturalist (2), iii., 4, 1907, p. 65, figure. *Id.*, Mulder and Trebilcock, *Ibid.* (2), iv., 1, 1909, p. 29, pl. i., figs. 1-3 (not *Plumularia balei*, Billard, Arch. de Zool. exp. et gén. (5), viii., 1911, p. lxiii., fig. 3).

Plumularia, sp. nov., Whitelegge in Etheridge, Mem. Austr. Mus., ii., 1889, p. 41.

Trophosome.—Hydrophyton reaching a height of 6 mm., monosiphonic, unbranched, bearing hydrothecæ as well as hydrocladia. The lower portion of the stem consists of a varying number of internodes separated by transverse joints, the lower internodes being destitute of appendages, while those nearest the cladate portion of the stem bear a series of several sarcothecæ. The latter internodes are separated by an articulation very oblique in lateral view, and resembling from the front two cones, the points of which interpenetrate. The hydrocladia are alternate, each borne towards the distal extremity of an internode. They spring from one side or the other of each stem-hydrotheca, and are divided into alternately long and short internodes, of which only the former bear hydrothecæ.

The hydrothecæ lie almost parallel with the hydrocladium in their proximal portion, while the distal part is curved outwards. The front wall of the hydrotheca is deeply inflected at about its middle. There is a well-developed anterior intrathecal ridge proceeding from about the middle of the front of the cell, and extending a little more than half-way across the cavity. The border of the hydrotheca is undulate, peaked behind and in front, and with a small lateral tooth-like projection opposite the peduncle of the supracalcine sarcotheca. The back is free.

The sarcothecæ are bithalamic, canaliculate; one in front of each hydrotheca, fixed, curved over and almost appressed to the hydrotheca; one slightly smaller, fixed, between every two hydrothecæ, on the intermediate internode; one, fixed, in the sinus behind the back of each hydrotheca; and one at each side of a hydrotheca borne on a long slender, tubular peduncle, and projecting beyond the border of the hydrotheca. These supracalcine sarcothecæ have the whole of one side open.

Gonosome not observed. The gonangia are described by Mulder and Trebilcock as "Gonothecæ—male, ovate slightly longer than hydrothecæ,

bearing one sarcotheca near base; female, about twice as long as hydrothecæ and almost as broad as long, ovate, truncate, bearing four sarcothecæ near base, margin thickened, operculate." According to measurements deduced from Mulder and Trebilcock's figures, the male gonangium has a length of 0.75 mm., and a maximum diameter of 0.50 mm., while the female gonangium is 1.35 mm. in length, and 1.17 mm. in maximum diameter.

Dimensions.—

Stem internode, length...	...	...	...	0.26-0.29 mm.
Stem internode, diameter	...	...	...	0.08-0.10 mm.
Hydroclade, length	...	...	...	up to 1.4 mm.
Hydroclade thecate internode, length	...	...	...	0.21-0.22 mm.
Hydroclade intermediate internode, length...	...	...	...	0.08-0.12 mm.
Hydrotheca, depth	...	...	...	0.22-0.24 mm.
Hydrotheca, diameter at mouth	...	...	...	0.23-0.24 mm.

These measurements do not agree very closely with those deduced from Mulder and Trebilcock's figure, but they correspond with those of Victorian examples in the Australian Museum collection. The specimen from Lord Howe Island otherwise agrees with the same authors' description of this rare species.

Remarks.—An examination of Whitelegge's slide listed as "*Plumularia*, sp. nov. ?" from Lord Howe Island, shows it to be identical with *Plumularia balei*, Bartlett.

Loc.—Middle Beach, Lord Howe Island.

Distribution.—Previously recorded only from the following localities on the Victorian coast—Bream Creek, Geelong; Queenscliff; and Airey's Inlet (Bartlett).

PLUMULARIA BUSKII, Bale.

Plumularia buskii, Bale, Biol. Res. "Endeavour," iii., 5, 1915, p. 296 (synonymy).

Several specimens of this species were obtained, which do not differ in any important particular from the type. The characteristic male and female gonangia are present on some of the colonies. The male gonangia are small, and are borne on the hydrocladia. They are ovate, with a sarcotheca at each side near the peduncle. The female gonangia are large, about three to three and one-half times as long as the male gonangia, and are borne on the stem. In the female gonangia the sarcothecæ are arranged in two series on the dorsal surface. Each series generally consists of five or six sarcothecæ; the lower ones are fairly evenly spaced, but towards the distal extremity the interval becomes reduced, and the uppermost two are brought very close together. Besides the parallel series of sarcothecæ, a single sarcotheca occupies a median position near the summit of the gonangium.

Dimensions.—

Gonangium (male), length	...	...	...	0.52-0.64 mm.
Gonangium (male), maximum diameter	...	...	...	0.22-0.24 mm.
Gonangium (female), length	...	...	...	1.80-1.90 mm.
Gonangium (female), maximum breadth	...	...	...	0.82-0.87 mm.

Loc.—Middle Beach, Lord Howe Island.

Distribution.—Previously recorded from Griffith Point, Victoria (Bale); Laysan Island, Hawaiian Archipelago (Hartlaub); Gulf of Manaar, Ceylon (Thornely); Flying-Fish Cove, Christmas Island, Indian Ocean (Ritchie); East Indies (Billard); Tasmania (Briggs); Great Australian Bight; South Australia; Bass Strait (Bale).

PLUMULARIA SPINULOSA, Bale.

Plumularia spinulosa, Bale, Journ. Micro. Soc. Vict., ii., 1882, p. 42, pl. xv., fig. 8. *Id.*, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 139, pl. xii., fig. 11-12. *Id.*, Lendenfeld, Proc. Linn. Soc. N.S.Wales, ix., 1885, p. 475. *Id.*, Bale, *Ibid.* (2), iii., 1888, p. 783, pl. xix., fig. 11-13. *Id.*, Warren, Ann. Natal Govt. Mus., i., 3, 1908, p. 320. *Id.*, Mulder and Trebilcock, Geelong Naturalist (2), iv., 4, 1911, p. 123, pl. iii., fig. 9, 9a.

Specimens of this minute and delicate species occur creeping over the surface of seaweeds. The colonies do not exceed 6 mm. in height. The hydrothecæ approach most closely those of Bale's figure¹⁴ (pl. xix., fig. 11) of a specimen from Coogee, New South Wales, in which the hydroclades terminate in a blunt conical point at the level of the margin of the hydrotheca, instead of being produced upwards into an incurved spine. The transverse markings of the hydrorhiza, to which Bale and Warren refer, are here well developed as thickenings of the perisarc which project into the interior of the hydrorhizal tubes.

Warren states that the gonosome is unknown. Bale, however, figures¹⁵ the gonangia and refers to them as "very large, ovate, truncate above, and with the margin rather widely everted." According to measurements deduced from Bale's figures the gonangia have a length of 1.05-1.1 mm., and a maximum diameter of 0.46-0.47 mm.

Dimensions.—

Stem internode, length	...	...	...	0.26-0.29 mm.
Stem internode, diameter	...	...	...	0.04-0.05 mm.
Hydroclade, length	...	...	...	0.26-0.28 mm.
Hydroclade thecate internode, length	...	...	...	0.22-0.23 mm.
Hydroclade intermediate internode, length	...	...	...	0.04-0.05 mm.
Hydroclade internode, diameter	...	...	...	0.08-0.05 mm.
Hydrotheca, depth	...	...	...	0.12-0.14 mm.
Hydrotheca, diameter at mouth	...	...	...	0.14-0.17 mm.

Loc.—Growing on sea-weeds thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Queenscliff, Victoria (Bale); Timaru, New Zealand (Lendenfeld); Coogee, New South Wales (Bale); Park Rynie, Natal (Warren); Barwon Heads, Victoria (Mulder and Trebilcock).

Genus HALICORNARIA, Allman.

HALICORNARIA ASCIDIoidES (Bale).

(Pl. vi., fig. 3.)

Aglaophenia ascidioides, Bale, Journ. Micro. Soc. Vict., ii., 1882, p. 32, pl. xiii., fig. 5.

¹⁴ Bale—Proc. Linn. Soc. N.S.Wales (2), iii., 1888, p. 783, pl. xix., fig. 11.

¹⁵ Bale—Proc. Linn. Soc. N.S.Wales (2), iii., 1888, p. 783, pl. xix., figs. 12-13.

Halicornaria ascidioides, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 176, pl. xiii., fig. 2, pl. xvi., fig. 1. *Id.*, Bale, Proc. Roy. Soc. Vict. (n.s.), vi., 1894, p. 106, pl. v., fig. 1.

A number of unbranched, simply pinnate colonies were found together with a large branched specimen, 10·5 cm. in height, with long hydrorhizal tubes at the base. The specimens are mature and bear well-developed gonangia, which spring from the bases of the hydrocladia. The characters agree in detail with Bale's descriptions except that the colonies are much larger than the Victorian specimens, which usually attain a height of about two inches (5 cm.).

Dimensions.—

Hydroclade-bearing internode, length	...	...	0·47-0·49 mm.
Hydroclade-bearing internode, diameter	...	...	0·40-0·42 mm.
Hydroclade internode, length	...	...	0·24-0·28 mm.
Hydroclade internode, diameter	...	...	0·17-0·21 mm.
Hydrotheca, depth	...	...	0·19-0·21 mm.
Hydrotheca, breadth at mouth (lateral aspect)	...	...	0·14-0·15 mm.
Hydrotheca, length free portion mesial sarcotheca	...	...	0·22-0·24 mm.
Gonangium, length	...	...	0·95-1·13 mm.
Gonangium, maximum width	...	...	0·40-0·54 mm.

Loc.—Thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Queenscliff and Port Phillip Bay, Victoria (Bale). Whitelegge¹⁶ has recorded the occurrence of this species at Maroubra Bay and Coogee Bay, New South Wales.

HALICORNARIA PROLIFERA (Bale).

Aglaophenia prolifera, Bale, Journ. Micro. Soc. Vict., ii., 1882, p. 34, pl. xiv., fig. 5.

Halicornaria prolifera, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 183, pl. xiv., fig. 1, pl. xvi., fig. 10. *Id.*, Ritchie, Mem. Austr. Mus., iv., 16, 1911, p. 858, pl. lxxxv., fig. 2, 3.

A number of branching specimens, 11 cm. in height, are characterised by the shortness of their mesial sarcothecæ, which are considerably abbreviated reaching only to the level of the anterior hydrothecal tooth. In this character the specimens agree with those originally described and figured (pl. xiv., fig. 5) by Bale (1882) from Queenscliff, Victoria, although later (1884) he showed that in robust and well-developed specimens, the mesial sarcothecæ are much longer and curved gracefully forwards.

Loc.—Thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Queenscliff, Victoria (Bale); Southern coast of New South Wales (Ritchie).

GENUS *AGLAOPHENIA*, Lamouroux.

AGLAOPHENIA DIVARICATA (Bush).

Aglaophenia divaricata, Bale, Biol. Res. "Endeavour," iii., 5, 1915, p. 309 (synonymy).

¹⁶ Whitelegge—Proc. Roy. Soc. N.S. Wales, xxiii., 1889, p. 194.

There are a few typical colonies of this form, the largest reaching a height of 17·5 cm. *Gonosome* not present.

Loc.—Thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Bass Strait (Busk, Allman, Bale); Swan Island, Banks Strait (Busk); Tasmania (Kirchenpauer, Briggs, Bale); Victoria (Kirchenpauer, Bale, Marktanner-Turneretscher); South Australia (Bale); New South Wales (Bale, Ritchie).

AGLAOPHENIA HOWENSIS, Briggs.

Aglaophenia howensis, Briggs, see ante, p. 27, pl. v., fig. 1-2, pl. vi., fig. 1. *Halicornaria*, sp. nov., Whitelegge in Etheridge, Mem. Austr. Mus., ii., 1889, p. 41.

An examination of Whitelegge's specimens listed as "*Halicornaria*, sp. nov.?" from Lord Howe Island shows them to be identical with *Aglaophenia howensis*, Briggs.

Loc.—Middle Beach, Lord Howe Island.

AGLAOPHENIA PARVULA, Bale.

Aglaophenia parvula, Bale, Journ. Micro. Soc. Vict., ii., 1882, p. 35, pl. xiv., fig. 3, 3a, 3b. *Id.*, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 165, pl. xiv., fig. 3, pl. xvii., fig. 10. *Id.*, Bale, Trans. and Proc. Roy. Soc. Vict., xxiii., 1887, p. 97. *Id.*, Bale, Proc. Linn. Soc. N.S. Wales (2), iii., 1888, p. 790. *Id.*, Marktanner-Turneretscher, Ann. K.K. Hofmus. Wien, v., 1890, p. 269. *Id.*, Bale, Proc. Roy. Soc. Vict. (n.s.), vi., 1894, p. 105. *Id.*, Vanhöffen, Deutsche Südpolar Exped., Bd. xi., Zool. iii., Hydroiden, 1910, p. 335, fig. 47.

On the surface of a sea-weed there occurred a hydrorhiza from which sprung three monosiphonic, unbranched, simply pinnate colonies, the largest 11 mm. in height. The minute characters agree in detail with Bale's diagnosis and figures of a specimen from Queenscliff, Victoria. The colonies, however, are somewhat smaller than those originally described.

Dimensions.—

Hydroclade-bearing internode, length	...	...	0·17-0·22 mm.
Hydroclade-bearing internode, diameter	...	...	0·13-0·14 mm.
Hydroclade internode, length	...	...	0·23-0·24 mm.
Hydroclade internode, diameter	...	...	0·06-0·07 mm.
Hydrotheca, depth	...	...	0·24-0·26 mm.
Hydrotheca, breadth at mouth	...	...	0·15-0·17 mm.

Loc.—Growing on a sea-weed thrown up on the sandy beach of the lagoon, Lord Howe Island.

Distribution.—Previously recorded from Queenscliff; Portland; and Port Phillip, Victoria (Bale); Port Jackson (Bale) and Kiama, New South Wales (Marktanner-Turneretscher); St. Paul Island (Vanhöffen).

Genus *THECOCARPUS, Nutting.*

THECOCARPUS BREVIROSTRIS (Busk).

Plumularia brevirostris, Busk, Voy. "Rattlesnake," i., 1852, p. 397.

Aglaophenia brevirostris, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 169. *Id.*, Kirkpatrick, Sci. Proc. R. Dublin Soc. (n.s.), vi., 1890, p. 611. *Id.*, Billard, C. R. Acad. Sci., cxlviii., 1909, p. 368. *Id.*, Bale, Proc. Roy. Soc. Vict. (n.s.), xxvi., 1, 1913, p. 135, pl. xiii., fig. 7-9.

Thecocarpus brevirostris, Billard, Ann. Sci. Nat., Zool. (9), xi., 1910, p. 51, fig. 24. *Id.*, Billard, Les Hydroïdes de l'Expéd. du Siboga, i., Plumulariidae, 1913, p. 89, fig. lxxv.

Aglaophenia heterocarpa, Bale, Journ. Micro. Soc. Vict., ii., 1882, p. 30 (note).

Aglaophenia vitiana, Bale, Cat. Austr. Hydroid Zoophytes, 1884, p. 153 (Not *Plumularia vitiana*, Kirchenpauer).

Aglaophenia maldivensis, Borradaile, Fauna and Geogr. Maldiv and Laccadive Archipel., ii., 1905, p. 843, pl. lxix., fig. 8-8b.

Halicornaria, sp. nov., Whitelegge in Etheridge, Mem. Austr. Mus., ii., 1889, p. 41.

A single simply pinnate, unbranched, unfascicled colony, 11 mm. in height, represents this species, which was originally described by Busk under the name of *Plumularia brevirostris*, from Cumberland Island, Queensland. The minute characters of the hydrothecæ agree with Bale's recent diagnosis and figures, except that the constriction of the hydrotheca is much less abrupt than that shown, and in this respect the hydrotheca approaches most closely the condition of that figured by Borradaile and by Billard. Such hydrothecæ occur in the specimens from Murray Island and from Fiji, but Bale has found that "in both cases the majority are of the more abruptly bent type."

Dimensions.—

Hydroclade-bearing internode, length	...	...	0.22-0.28 mm.
Hydroclade-bearing internode, diameter	.	..	0.13-0.15 mm.
Hydroclade internode, length	...	.	0.24-0.28 mm.
Hydroclade internode, diameter	..	...	0.07-0.08 mm.
Hydrotheca, depth	.	...	0.26-0.27 mm.
Hydrotheca, breadth at mouth	...	...	0.09-0.10 mm.
Hydrotheca, length free portion mesial sarcotheca			0.07-0.08 mm.

Remarks.—An examination of Whitelegge's slide listed as "*Halicornaria*, sp. nov.?" from Lord Howe Island shows it to be identical with *Thecocarpus brevirostris* (Busk).

The range of this species must be extended to the Kermadecs as I have recently examined a specimen from Denham Bay, Sunday Island, Kermadec Islands.

Loc.—Lord Howe Island.

Distribution.—Previously recorded from Cumberland Island, Queensland, 27 fathoms (Busk); Fiji (Bale); Murray Island, Torres Strait, 15-20 fathoms (Kirkpatrick); Hulule, Male Atoll, Maldiv Islands (Borradaile); East Indies (Billard).

III.—ADDENDUM.

An examination of the co-types of the species described by Hilgendorf¹⁷ under the names of *Aglaphenia* ? x and *Aglaphenia* ? y, from the Kermadec Islands, has enabled me to assign these species to their correct positions.

Family PLUMULARIDÆ.

Genus HALICORNARIA, Busk.

HALICORNARIA HIANs, Busk.

Halicornaria hians (Busk), Billard, Les Hydroides de l'Expédition du Siboga, i.,—Plumulariidae, 1913, p. 68 (synonymy).

Aglaphenia ? y, Hilgendorf, Trans. N.Z. Inst., xliii., 1910 (1911), p. 543, fig. 5.

The co-type of the species described by Hilgendorf as *Aglaphenia* ? y agrees with Bale's¹⁸ description and figures of *Halicornaria hians* (Busk), except for the greater length of the thecate internodes compared with their diameter, the greater depth of the hydrothecæ and their more erect posture, and the greater distance of the intrathecal ridge from the base of the hydrotheca. In these characters the specimen comes nearest to the variety described by Ritchie¹⁹ from the Andaman Islands as *Halicornaria hians* (Busk), var. *profunda*. I, therefore, arrange the synonymy as above, following Billard in including Ritchie's variety in the synonymy of *H. hians*.

Loc.—Denham Bay beach, Sunday Island, Kermadec Islands.

Genus LYTOCARPUS, Allman.

LYTOCARPUS PHŒNICEUS, Busk.

Lytocarpus phœniceus (Busk), Billard, Les Hydroides de l'Expédition du Siboga, i.,—Plumulariidae, 1913, p. 74, fig. lx. (synonymy).

Aglaphenia ? x, Hilgendorf, Trans. N.Z. Inst., xliii., 1910 (1911), p. 542, fig. 4.

The co-type of the species described by Hilgendorf under the name of *Aglaphenia* ? x agrees exactly with the descriptions and figures of *Lytocarpus phœniceus*, Busk. I, therefore, arrange the synonymy as above.

Loc.—Denham Bay, Sunday Island, Kermadec Islands.

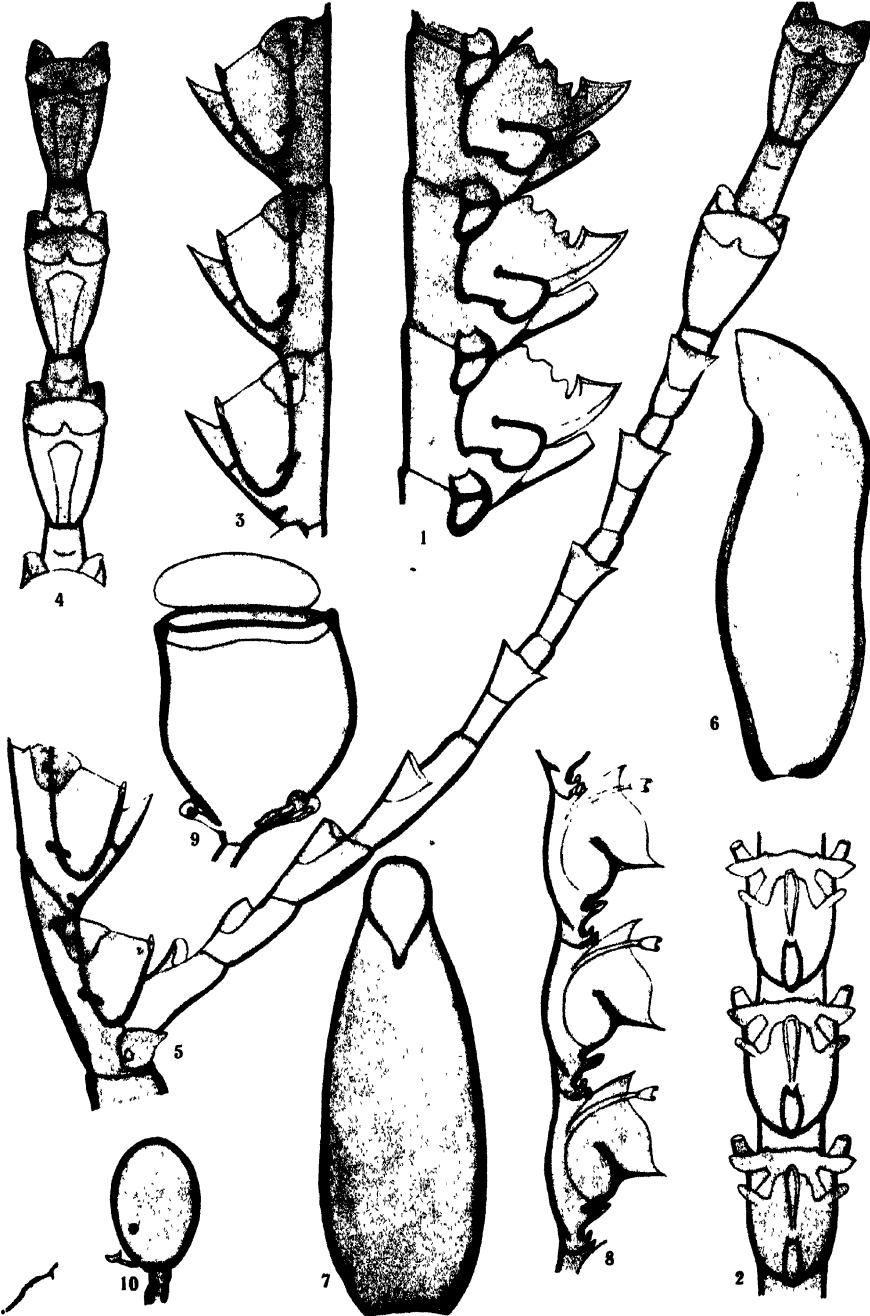
¹⁷ Hilgendorf—Trans. N.Z. Inst., xliii., 1910 (1911), pp. 542, 543, fig. 4, 5.

¹⁸ Bale—Cat. Austr. Hydroid Zoophytes, 1884, p. 179, pl. xiii., fig. 6, pl. xvi., fig. 7.

¹⁹ Ritchie—Rec. Indian Mus., v., 1, 1910, p. 24, pl. iv., fig. 13, 14.

EXPLANATION OF PLATE V.

- Fig. 1. *Aglaophenia howensis*, Briggs, portion of hydroclade with hydrothecæ, lateral aspect. Drawn from the holotype from Middle Beach, Lord Howe Island.
2. *Aglaophenia howensis*, Briggs, portion of hydroclade with hydrothecæ, anterior aspect. Drawn from the holotype.
3. *Aglaophenopsis vaga*, Briggs, portion of hydroclade with hydrothecæ, lateral aspect. Drawn from the holotype from off Botany Bay, New South Wales, 50 fathoms.
4. *Aglaophenopsis vaga*, Briggs, portion of hydroclade with hydrothecæ, anterior aspect. Drawn from the holotype.
5. *Aglaophenopsis vaga*, Briggs, proximal internode of hydrocladium with phylactogonium. Drawn from the holotype.
6. *Aglaophenopsis vaga*, Briggs, gonangium seen in lateral aspect. Drawn from the holotype.
7. *Aglaophenopsis vaga*, Briggs, gonangium seen in frontal aspect. Drawn from the holotype.
8. *Plumularia balei*, Bartlett, portion of hydroclade with hydrothecæ, lateral aspect. Drawn from a specimen from Lord Howe Island.
9. *Plumularia balei*, Bartlett, female gonangium (after Mulder and Trebilcock).
10. *Plumularia balei*, Bartlett, male gonangium (after Mulder and Trebilcock).



EXPLANATION OF PLATE VI.

- Fig. 1.** *Aglaophenia howensis*, Briggs. Photograph of the holotype, 6 cm. in height, from Middle Beach, Lord Howe Island.
2. *Aglaophenopsis vaga*, Briggs. Photograph of the holotype, 16 cm. in height, from off Botany Bay, New South Wales, 50 fathoms.
3. *Halicornaria ascidioides* (Bale). Photograph of a specimen, 10·5 cm. in height, from Lord Howe Island.



TWO REMARKABLE CORALS FROM THE DEVONIAN OF NEW SOUTH WALES

(*Spongophyllum halysitoides*, and *Columnaria nemianthensis*.)

ERRATUM.

Records of the Australian Museum, Vol. xii, No. 4, p. 49, line 7, ,
should read :—

I—A NONSEPTATE SPONGOPHYLLUM (*Spongophyllum halysitoides*). *ides*)

A peculiar and abnormal *Spongophyllum* of remarkably simple structure and septateless.

The specimen consists of a small corallum two and a quarter inches by one inch, evidently only a portion of a larger mass, and with the upper surface beautifully weathered. The corallites are polygonal and vary much in size, the average diameter being from four to six millimetres; they are firmly amalgamated laterally. The walls of the respective corallites, well defined and strong, are the striking feature of this coral.

In a transverse view each corallite looks as if its polygonal outline was composed of a string of minute shuttle-like figures, swelling and contracting alternately. Within each calice, and continuously throughout the successive visceral chambers in descending order, this structure is actually caused by the deep and regular fluting of the walls. Looking down on these walls from above, and shutting one's eyes to the interior vesicular structure, the resemblance to the meandering corallite lines in *Halysites* is truly astonishing, hence the specific name I have applied to this coral.

There is the usual tripartite structure, although the demarcation is ill-defined. Immediately within the fluted walls is (by comparison) a broad peripheral zone of variously shaped vesicles, some large, others small. This is followed by the intermediate zone, or cycle, which by rights should be septate. It is extremely narrow, not always present even, but when so, of a peculiar structure, to be referred to later. In some corallites certainly, a few rudimentary short septa do occur, slightly projecting into the central, and what in an ordinary Rugose coral would be the tabulate area; here, however, it is purely vesicular.

In a longitudinal section all that is necessary to notice particularly is the structure of what would be the septate zone and the central area; in passing, attention may be called to the very varied form of the peripheral vesicles. From Pl. viii., fig. 3, it will be seen that the intermediate zone is really a tabulate area, without any mural investment, but depending for its demarcation on the convex surfaces of the distal peripheral vesicles and the lateral surfaces of those of the central area. It is transversely divided by floors, mostly horizontal, but as they are parts of an area at times slightly septate, may be spoken of as dissepimental vesicles. Finally, the central area of each corallite of one or more ranges of egg-shaped vesicles, their longitudinal diameters being the greater.

I know of no Australian *Spongophyllum* with a structure at all approaching that of this coral, viz., the fluted condition of the corallite walls, and practically the lack of septa.

Loc.—Road near Beedle's Farm, Moonbi, Co. Inglis, New South Wales.

Hor.—Middle Devonian ?

II.—A SPECIES OF *Columnaria* FROM THE NEW SOUTH WALES DEVONIAN.

The corallum in this coral is, in accordance with the more typical structure of *Columnaria*, composite and massive, in this instance boliti-form in shape, measuring six and a half inches by five. The straight prismatic polygonal corallites, firmly united to one another laterally have an average diameter of 3 mm., sometimes increasing to 4 mm. The corallite walls are well developed, unthickened with stereoplasma, and the primordial walls constantly visible in the structural sclerenchyma.

The septa are plain and non-denticulate, primary and secondary, but irregular in development. The normal number appears to be twenty, the average fifteen inclusive, whilst twelve is not an uncommon number. The full number of twenty is much less than that seen in the type species, *C. alveolata*, in which there are from twelve to fifteen in both series, primary and secondary.

The irregularity in the septal development is remarkable. The primary septa (1) may, or may not, reach the calicinal centre; (2) are rarely straight, but usually more or less curved; (3) two or three contiguous lamellæ may unite near the centre, or at half the distance between the latter and the corallite wall and there stop short, thus forming fasciculate bundles more or less; (4) those that arrive at the calicinal centre appear to become confused with one another, hardly an intermingling, and certainly no revolution; (5) exceptionally several may unite at the centre, as many as six have been counted, but there is no appearance whatever of a St. George cross as in the genus *Stauria*. The secondary septa (1) may be about half the length of contiguous primaries; (2) reduced to mere tooth-like projections; (3) often not developed at all between any two primaries; (4) two instead of one may occupy such a position.

This union of two or three primary septa at or near the calicinal centre certainly occurs in the type species *C. alveolata*, Goldfuss,¹ and again in *C. calicina*, Nicholson,² but extreme irregularity, as described above, is not seen in any illustrations I have access to.

Although the primordial corallite walls are preserved those of the septa are not so. There is no trace whatever of dissepimental tissue within the interseptal loculi.

When examined in longitudinal section, the lamellar nature of the septa is at once made apparent. The tabulæ are complete and horizontal, but slightly deflected at the extreme peripheries, and on same plane in contiguous corallites; neither convex nor concave floors were observed.

The structure of this coral is obviously that of *Columnaria*, as depicted by Nicholson, and following him, by Lambe. The only valid difference I can see is the often actual extension of the septa to the centres of the visceral chambers, the confusion I previously mentioned being perhaps due to stress, of which evidence is certainly present. It is proposed to call it *Columnaria neminghensis*.

¹ Nicholson—Tab. Corals Pal Period, 1879, pl. x, fig. 2.

² Lambe—Contrib. Canadian Pal., ii., pt. ii., 1900, pl. vi., fig. 4.

From *Columnaria alveolata*, Goldfuss, and *C. halli*, Nicholson, the present coral is distinguished by a much less number of septa, and from the latter also by the fact that the septa are plain and non-denticulate along the free edges.³ The mode of growth in another American species, *C. rugosa*, Billings, is quite different—"an aggregation of circular or rounded polygonal corallites,"⁴ and the septa amount to forty. *C. calicina*, Nicholson, is a more diminutive species, the corallites comparatively lax and discrete in their mode of growth, with an average of twenty-eight septa. *C. disjuncta*, Whiteaves, is an extreme form of the genus in which the corallites are generally free, with usually thirteen septa.⁵ Several other American species have been described, but I regret I have not access to the literature bearing on them.

In 1897 I described a small coral, for which I was indebted to the late Rev. Father Dowling, then of Bathurst, and to which I gave the name of *C. pauciseptata*.⁶ There are certain anomalous characters in this coral, but on the whole, I have not, up to the present, seen any reason to change the generic reference. A second Australian species occurs in Victorian rocks, *C. cresswelli*, Chapman, for which the author suggested the sub-generic title of *Loyolophyllum*,⁷ but the species is clearly not a typical *Columnaria*. Mr. Chapman wrote:—"The intermediate calicular pouches [interseptal loculi] are traversed in the outer zone by endothecal or vesicular tissue in the form of curved dissepiments, the latter rudely concentric." This structure so entirely departs from that typical of *Columnaria* that I would suggest to Mr. Chapman the advisability of considering his name of generic rather than sub-generic rank.

Several European species exist, such as *C. sulcata*, Lonsdale (non Goldfuss),⁸ found in Russia; *C. gothlandica*, Ed. and H.,⁹ and possibly the species referred by Dybowski to his genus *Cyathophylloides*,¹⁰—*C. fasciculus*, Kutorga, and *C. irregularis*, Dybowski. The two first-named are clearly of the type of *C. alveolata*, and therefore quite distinct from the present species.

Loc.—Portion 181, Pa. Nemingha, Co. Parry, Tamworth District, New South Wales.

Hor.—Devonian; Lower Limestone of series.

Collector.—C. Cullen, 1899.

³ Lambe—*Loc. cit.*, p. 100.

⁴ Lambe—*Loc. cit.*, p. 101.

⁵ Whiteaves—Contrib. Canadian Pal., I., pt. iv., p. 269, pl. xxxiv., figs. 3-3b.

⁶ Etheridge—Rec. Austr. Mus., iii., No. 2, 1897, p. 30, pl. viii.

⁷ Chapman—Rec. Geol. Survey Vict., iii., pt. 3, 1914, p. 306, pl., li, figs. 15 and 16

⁸ Lonsdale—Murchison's Geol. Russia and Ural Mts., I., pl. A., figs. 1, 1a-c.

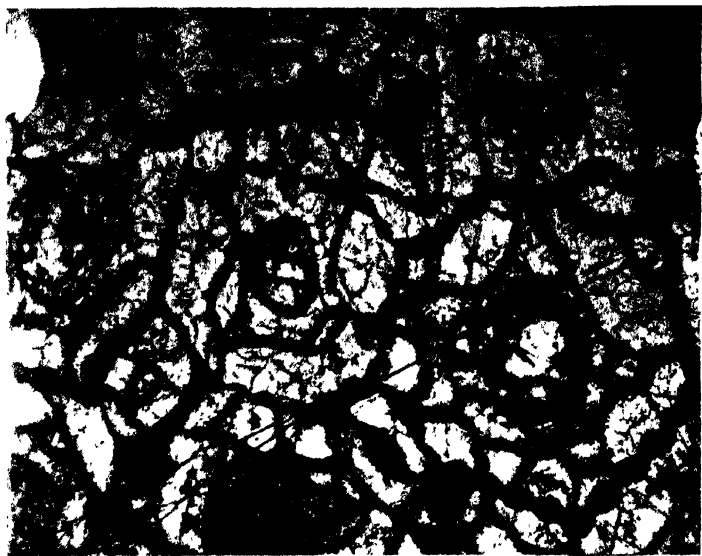
⁹ Edwards & Haime—Polyp. Foss. Terr. Pal., 1850, p. 309, pl. xiv., figs. 2 and 2a

¹⁰ Dybowski—Archiv. Liv.-Ehst.-Kurlands, v., lief. 3, 1873, p. p. 380-81.

EXPLANATION OF PLATE VII.

Spongophyllum halysitoides, *Eth. fil.*

- Fig. 1. Weathered surface of portion of a corallum. With the aid of a pocket lens, and in some of the corallites even without, the fluctuating walls of the latter, resembling the structure of the corallites in *Halysites*, are distinctly visible.
2. Transverse section prepared for the microscope exhibiting the same features as in Fig. 1, especially at the left hand corner of the section. Also the peripheral vesicular zone of each corallite, the non-septate intermediate area, and the central vesicular space—x 8 diam.
 3. Similar longitudinal section. It will be noticed that what should be the intermediate septal area zone is really a tabulate area supported without and within by convex surfaces of the peripheral and central vesicles respectively—x 8 diam.



2



3

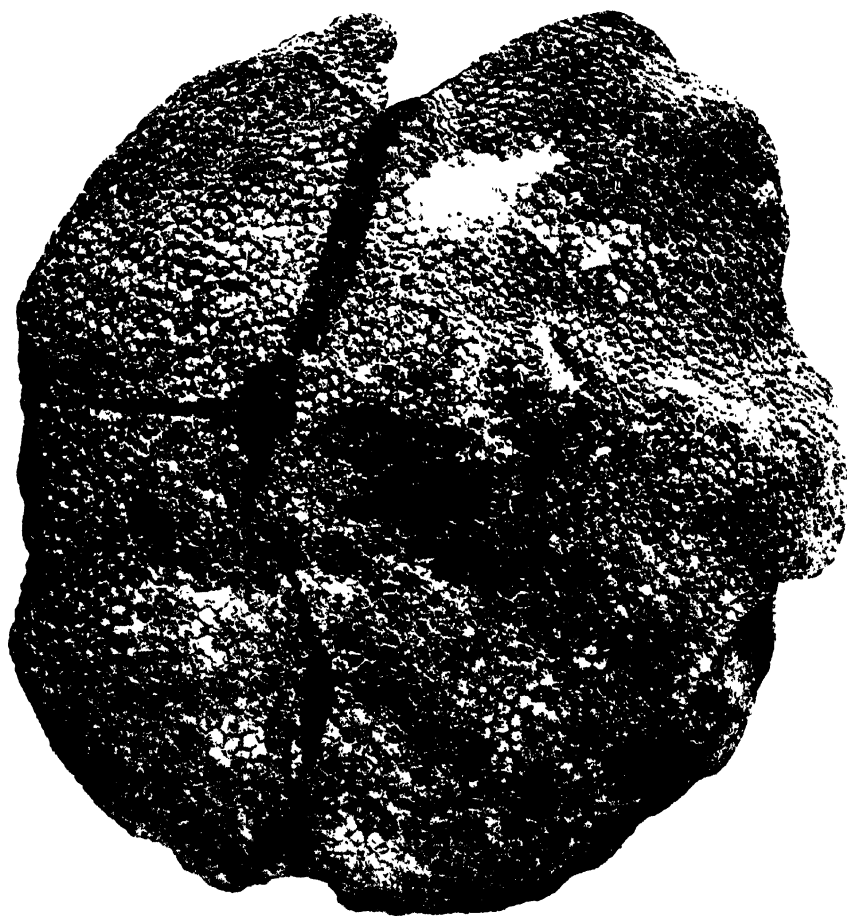


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EXPLANATION OF PLATE VIII.

Columnaria neminghensis, *Eth. fil.*

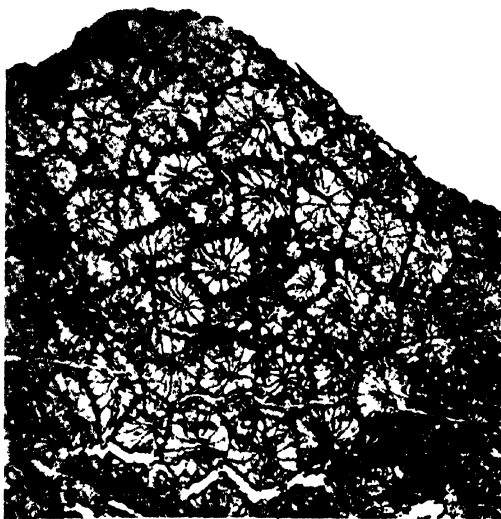
The corallum seen from above.



EXPLANATION OF PLATE IX.

Columnaria neminghensis, *Eth. fil.*

- Fig. 1. Transverse section, prepared for the microscope, exhibiting the variability in the arrangement of the septa—x $3\frac{1}{2}$ diam.
2. Longitudinal section displaying the lamellar septa and tabulæ—x $3\frac{1}{2}$ diam.



1



2

STUDIES IN AUSTRALIAN TABANIDÆ

BY

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Townsville.

The following paper is the result of an examination of the Tabanidæ in the Australian Museum, Sydney, which comprises one hundred and twelve specimens representing forty-six species and four varieties referable to seven genera.

Twelve species and four varieties are described as new, while the males of *Erephopsis cinerea*, Ricardo, *Diatomineura pulchra*, Ricardo, and *Tabanus postponeus*, Walker, are also described for the first time. Notes on previously known forms are added where necessary.

The new species are distributed in the following genera:—*Erephopsis* (two and one var.), *Diatomineura* (three), *Pelecorhynchus* (two), *Silvius* (one), *Ectenopsis* (one var.) and *Tabanus* (four and two vars.).

One synonym is noted and one name is changed, on the grounds of priority, though they have no connection with the material under review.

The type specimens are in the Australian Museum. One paratype is in the Institute Collection.

This paper brings the number of known Australian Tabanidæ to one hundred and eighty-eight species and five varieties, which are distributed in fifteen genera.

I wish to thank the Trustees and Mr. R. Etheridge, Junr., Director and Curator, of the Australian Museum, for giving me the opportunity to study these forms.

Sub-family PANGONINÆ.

PELECORHYNCHUS DISTINCTUS, sp. nov.

♀. Length, 14; width of head, 4.5, length of wing, 13.2 mm.

A handsome well-marked species easily identified by its warm black thorax with lateral yellowish-brown stripes; thorax bright orange-rufous with a median black stripe. Legs reddish-yellow, tarsi paler. Wings with dusky brown and orange spots.

Head.—Face and cheeks buff, the former very convex, with a short median dark stripe, an almost quadrate brown blotch beneath the stripe and with a larger nude reddish-brown patch on either side of the apex of the middle third, grooves separating face and cheeks deep; pubescence long, mixed black and white, the latter more numerous basally; beard white, dense; front buff, ocellar triangle and base of antennæ dusky brown, pubescence on ocellar triangle black, long; first joint of antennæ black, with long brownish pubescence, second joint yellowish, third joint bright orange-rufous; palpi pale reddish-yellow, second joint with long white pubescence; eyes black, bare; proboscis dark brown.

Thorax.—Warm black with a sub-median and lateral pale yellow ochre stripe on each side, the former continued to posterior margin of the scutellum; pubescence black, pale on the sides, white beneath the shoulders, beneath and behind the wing roots; scutellum warm black in the centre, pale yellow-ochre elsewhere, posterior pubescence white on the sides, brownish in the middle; pleuræ black with grey pubescence.

Abdomen.—Orange-rufous with a median black stripe extending to the middle of the penultimate segment, lateral margins widely reddish-brown, dark brown on the first segment; venter dark reddish-brown, lateral pubescence white, long.

Legs.—Femora and tibiae reddish-yellow, tarsi warm buff; pubescence reddish-yellow, paler on the tarsi.

Wings.—Dusky brown with the upper half deeper hued, the apex of the radial, the cubital cell and portion of the apex of the apical cell clear, with clear patches in the first, second, fourth and fifth posterior cells, the discoidal, anal and the auxiliary cells, with an orange spot reaching from the costa through the subcostal into the cubital cell; veins brown; no appendix present; halteres dark brown.

Obs.—Described from two specimens. This species belongs to the *fulvus-mirabilis* group of *Pelecorynchus*, but may be readily separated from *P. mirabilis*, Taylor, by its different facial and thoracic markings and the color of the legs. It may be distinguished from *P. fulvus*, Ricardo, by the russet colored thorax, abdomen and wings, and by the black legs with yellow tarsi.

Hab.—Dorrigo, New South Wales. (Collector and donor.—R. J. Tillyard).

PELECORHYNCHUS TILLYARDI, sp. nov.

♀. Length, 16.5; width of head, 5; length of wing, 13 mm.

A striking species owing to its black color. First and second joints and base of third joint of the antennæ black; the next four annuli warm-buff, and remaining annuli black. Wings black. First and second abdominal segments with dense white pubescence.

Head.—Face, cheeks and front black with grey tomentum, pubescence black; beard black; groove between face and cheeks deep; palpi black, pubescence black, long; antennæ with the first two joints and base of third black, next four annuli warm buff, remaining annuli black; pubescence on the first two joints black, scanty; ocelli prominent.

Thorax.—Black with two broad median grey stripes terminating at the posterior margin of the thorax with a short wedge-shaped black stripe in each grey one from the posterior margin of thorax and a narrow black stripe separating the grey ones; pubescence black, lateral pubescence long and a tuft of white hairs behind the wing roots; pleuræ black with black pubescence.

Abdomen.—Black, first segment with dense white pubescence, except in the centre, where it is black, second segment with a basal lateral triangular patch of white pubescence, remaining segments shining black, pubescence black, fairly long on sides of fourth segment; venter black with black pubescence.

Legs.—Black, pubescence black, fairly long on the femora.

Wings.—Black, veins black, all cells open, no appendix.

Obs.—Described from a single specimen which is abundantly distinct from all other known species of *Pelecorynchus* on account of its general colour. It affords me great pleasure to dedicate this handsome species to its discoverer.

Hab.—Dorrigo, New South Wales. (Collector and donor.—R. J. Tillyard)

PELECORHYNCHUS FUSCONIGER, Walker.

List. Dipt., i. (1848), p. 192 [? *Silvius*] et. v., Suppl. 1. (1854), p. 267, [*Dasybasis*]; Ricardo, Ann. Mag. Nat. Hist. (8), v. (1910), p. 407.

Hab.—Woodford, New South Wales.

PELECORHYNCHUS NIGRIPENNIS, Ricardo.

Ann. Mag. Nat. Hist. (8), v. (1910), p. 405.

Obs.—This appears to be a widely distributed species being found from Southern Queensland to Tasmania.

Hab.—Ebor, New South Wales. (Collector and donor.—R. J. Tillyard); Stradbroke Island, Queensland. (Collector.—J. C. Bridwell).

EREPHOPSIS CINEREA, Ricardo.

Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 26.

♂. Length, 11; width of head, 4.5; length of wing, 10; proboscis, 4 mm.

Lower third of eyes with small facets; antennæ blackish-brown, first two joints with long black hairs; palpi black with second joint slightly longer than the first, ending in a blunt point, pubescence black, a dirty white at base of first joint.

Thorax.—Lateral borders with long black pubescence, and long white hairs from wing roots to scutellum.

Abdomen.—First segment clothed with grey pubescence, sides of second to sixth segments with apical grey pubescence.

Obs.—A very distinct species, the long stem of the first posterior cell and the large stigma being very distinctive.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

EREPHOPSIS NEOTRICOLOR, sp. nov.

♀. Length, 10.5-11; width of head, 4; length of wing, 10.5; proboscis, 5.5-6 mm.

A small species with black thorax, brown abdomen with median stripe; the cross-veins shaded brown and with brown legs.

Head.—Face convex, reddish-brown, cheeks darker with grey tomentum, pubescence black; front black, tomentum ashen, vertex about half as wide as base, pubescence black, no frontal callus; eyes covered with dense pale pubescence; antennæ red, first two joints paler than third with long black pubescence, apex of third black; palpi red, second joint concave and longer than first, pubescence black; beard dense, creamy-white; proboscis long, black.

Thorax.—Black, clothed with mixed, erect black and scattered appressed golden hairs, lateral borders with long black and cream colored hairs and pale ones behind the wing roots; scutellum similar to thorax; pleuræ black, covered with pale pubescence.

Abdomen.—Reddish-brown, the fourth to the apical segments blackish, segmentations pale, segments one to three with median square black spots not reaching the posterior borders, all segments with traces of median pale apical hairs, pubescence black, golden on the segmentations and at the sides; venter reddish-brown, pubescence yellowish.

Legs.—Coxæ black with long pale pubescence, femora and tibiæ reddish-brown, tarsi darker, pubescence black.

Wings.—All the cross-veins shaded brown, the cells on the inner half of the wing mainly clear, rest slightly tinged with brown; stigma yellow; a small appendix present; the first posterior cell closed a short distance from the border.

Obs.—A small species closely related to *E. tricolor*, Walker, but may be separated from it by its different front, abdomen and wings. It is also close to *E. doddi*, Ricardo, but differs in the thorax, legs and wings.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

EREPHOPSIS GEMINA, Walker.

List. Dipt., i. (1848), p. 138; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 24.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

EREPHOPSIS GIBBULA, Walker.

List. Dipt., i. (1848), p. 140; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 22.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

EREPHOPSIS SUBMACULA, Walker.

List. Dipt., i. (1848), p. 142; Ricardo, Ann. Mag. Nat. Hist. (7), v. (1900), p. 115.

Represented by a single specimen, which agrees fairly well with Ricardo's description. The face lacks the black square mark above the palpi; the first three abdominal segments have lateral white pubescence, very pronounced on the first and reduced to a small patch on the third; venter with interrupted white bands on the second to fourth segments.

Hab.—Western Australia.

EREPHOPSIS MACULIPENNIS, Macquart.

Dipt. Exot., Suppl. iv. (1849), p. 20; Ricardo, Ann. Mag. Nat. Hist. (8), xix. (1917), p. 209.

A ♂ specimen labelled as above shows some discrepancies both from the original and Miss Ricardo's descriptions in as much as the black spots on the abdomen, which is entirely testaceous, are absent, as is also the appendix on the wing. First two joints of the antennæ red-brown, the third reddish-yellow, apex darker. The beard is tawny.

Hab.—South Australia.

EREPHOPSIS LASIOPHTHALMA, Boisduval.

Voy. "Astrolabe," Zool. ii. (1832), p. 666, [Pangonia]; Ricardo, Ann. Mag. Nat. Hist. (8), xix. (1917), p. 210.

Obs.—Four specimens agree very well with Miss Ricardo's description of this species. They show that the narrowing of the first posterior cell at the border is a variable character—one specimen has it barely closed

on one wing, on the other wing the first posterior cell has a distinct petiole. Another specimen shows a distinct petiole to the first posterior cell on both wings.

Hub.—Moonbar and Jindabyne, New South Wales. (Collector.—R. Helms).

EREPHOPSIS VICINA, sp. nov.

♂. Length, 14; width of head, 5.5; length of wing, 14; proboscis, 5 mm.

A species with clear wings; thorax with five grey stripes; abdomen mainly reddish-brown with black spots in the middle of the second and third segments and lateral golden pubescence on the thorax and abdomen; legs reddish-brown.

Head.—Face and cheeks covered with grey tomentum and long grey hairs mixed with scattered black ones; beard orange; first joint of antennæ swollen, long, black, base red-brown, second joint dark red-brown, base of third red-brown, annuli black, pubescence on first two joints black, long and dense; palpi black, second segment considerably longer than first, tapering to a blunt point, apex reddish, pubescence creamy-white, dense; proboscis black; eyes covered with dense black pubescence.

Thorax.—Black, reddish-brown above wing roots, with three grey stripes on the anterior half and one on either side above the wing roots on the posterior half; pubescence on lateral borders black on the anterior half and a dense row of orange hairs beneath the black ones the whole length of the thorax, there is a tuft of grey hairs behind the wing roots; scutellum black; pubescence black; pleura with grey tomentum and pubescence.

Abdomen.—First segment black, sides red-brown, second red-brown with an apical lateral patch, third black with red-brown flecks, fourth and fifth black, segmentations red-brown; second segment with a median black spot, segments one to three with traces of orange hairs medially, lateral pubescence orange; venter black, segmentations red-brown, pubescence grey and black, that on segmentations pale, yellowish towards apex.

Legs.—Coxæ blackish with grey pubescence; femora, tibiæ and tarsi red-brown, pubescence black, grey on upper surface of femora.

Wings.—Clear, basal half of fore border and base yellowish, cross-veins at base of third vein and discal cell tinged brown; veins dark brown, stigma yellow; no appendix.

Obs.—A species most nearly related to *E. aureohirta*, Ricardo, but differs in the color of the antennæ, palpi and legs, and the ornamentation of the thorax and abdomen.

Hub.—Wentworth Falls, New South Wales. (Collector and donor.—A. Musgrave).

Var. GEORGII, var. nov.

♀. • Similar to the type but the beard is yellow instead of orange; the lateral fringe of orange hairs on the thorax and abdomen is replaced by yellow ones, with black ones above on the abdominal segments, longest on the third and fourth segments.

The front is about one third broader anteriorly than at vertex and black with black pubescence; first two joints of antennæ dusky-brown, rest red-brown; palpi black, second joint red-brown above, concave, ending in a fine point; basal half of femora black. The spot on the wing is also more prominent.

Obs.—The above differences, in the absence of fresh material, do not, to my mind, warrant the variety being raised to specific rank.

Hub.—King George Sound, Western Australia. (Collector.—G. Masters).

EREPHOPSIS JACKSONI, Macquart.

Dipt. Exot., i. (1838), p. 102; Ricardo, Ann. Mag. Nat. Hist. (7), v. (1900), p. 117.

Obs.—Two specimens before me may probably belong to this species. One specimen bears label "*Erephopsis ? jacksoni, Mcq.*" in Miss Ricardo's handwriting.

The Queensland specimen is somewhat abraded, but I am unable to separate it specifically from the Western Australian form.

Hub.—King George Sound, Western Australia. (Collector.—G. Masters); Queensland.

DIATOMINEURA JACKSONENSIS, Guérin.

Voy. de la "Coquille," ii., pt. 2 (1830), p. 289; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 27.

Obs.—A specimen in the collection agrees too closely with the description of this species to separate it specifically in the absence of more numerous material.

Hub.—South Australia.

DIATOMINEURA GAGATINA, Bigot.

Mém. Soc. Zool. Fr., v. (1892), p. 620; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 33.

Obs.—I identify three specimens as the above species which agree in all essentials with Miss Ricardo's description. There is a prominent tuft of orange-colored hair beneath the wing roots, of which no mention is made in the descriptions.

Hub.—Gayndah, Queensland. (Collector.—G. Masters); Magnetic Island, Cleveland Bay, Queensland. (Collector.—F. H. Taylor).

DIATOMINEURA CYDISTER, sp. nov.

♂. Length, 11.5-12; width of head, 4; length of wing, 9.5 mm.

A small handsome blackish species with reddish-yellow markings on the abdomen; antennæ, palpi and thorax black; legs black and reddish-brown; wings shaded brown on fore border; abdomen dark chocolate brown.

Head.—Face, and cheeks black, pubescence black and cream colored, the former mainly on the cheeks; beard cream-colored; antennæ black, first two segments with grey tomentum and black pubescence, base of third oblong, its sides parallel, its base reddish-brown; palpi black, with long black pubescence; eyes black, pubescence black.

Thorax.—Black with indications of two submedian grey stripes, one on either side, lateral borders with black pubescence, pale behind the wings; pleuræ black, tomentum and pubescence grey; scutellum dark chocolate brown.

Abdomen.—Dark chocolate brown, pubescence dark, pale on the segmentations, all the segments with reddish-yellow, lateral, posterior blotches, with pale pubescence, smallest on the last three segments; venter reddish-brown, pubescence pale.

Legs.—Coxæ, femora and tarsi black, basal half of tibiæ reddish-brown, rest black; pubescence on coxæ and femora above at base pale, elsewhere black.

Wings.—Grey, veins on fore half and cross-veins at base of discal cell shaded brown, except anterior branch of third vein; first posterior cell widely open at border; no appendix; stigma brown; halteres black.

Obs.—A very distinct and striking species on account of its abdominal ornamentation. One of the two specimens bears a label by Miss Ricardo "*Diatomineura* sp., near *gemella*, Wek."

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

DIATOMINEURA PULCHRA, Ricardo.

Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 35.

♂. Length, 9.5; width of head, 3.5 (vix); length of wing, 9; proboscis, 2 mm.

Head.—Face and cheeks covered with yellow tomentum and mainly black with scattered yellow pubescence; face with a deep median furrow, the groove deep between the face and cheeks: palpi orange-yellow, first joint short, swollen, less than half the length of the second which ends in a blunt point; pubescence scanty, yellowish; first two joints of antennæ with yellow tomentum and black pubescence; pubescence on eyes pale on the sides, dark elsewhere.

Thorax.—Similar to that of the female.

Abdomen.—Similar to ♀, but the golden-yellow haired stripe is also present on the first two and fifth segments in addition to the third, fourth and sixth segments.

Legs.—Reddish-yellow, tarsi darker, femora appear yellow in some lights; pubescence black.

Wings.—Greyish, first posterior cell not narrowed at the border.

Obs.—This specimen is labelled by Miss Ricardo as "perhaps the undescribed ♂ of *D. pulchra*, Ric." It is so similar in appearance to the ♀ that I describe it as such.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

DIATOMINEURA BREVIROSTRIS, Macquart.

Dipt. Exot., Suppl. iv. (1842), p. 326; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 28.

Obs.—The South Australian specimens were identified by Miss Ricardo—the Long Flat specimens are identical.

Hab.—South Australia. Long Flat, Hastings River, New South Wales; (Collector and donor.—A. R. McCulloch).

DIATOMINEURA REGIS-GEORGII, *sp. nov.*

♀. Length, 9.5-10; width of head, 3.25-3.5; length of wing, 9.5-10; proboscis, 4.5 mm.

Head.—Face convex, creamy, pubescence creamy; cheeks greyish, tinged creamy, pubescence creamy; groove between face and cheeks deep; front about twice as wide anteriorly, tomentum grey-brown, pubescence dark; no frontal callus; pubescence on eyes dark, pale on outer margin; first two joints of antennæ pale reddish-yellow, pubescence black, third joint red; palpi deep yellow, upper margin of second joint concave, reddish, pubescence black; proboscis black, long; beard grey, dense.

Thorax.—Black, tomentum grey, pubescence golden, lateral black, a tuft of grey pubescence beneath and behind the wing roots; scutellum black, posterior border with long golden pubescence; pleuræ black, tomentum and pubescence grey.

Abdomen.—The centre of the first and second segments and the posterior border black, remainder yellowish-brown, remaining segments black, posterior segmentations yellowish-brown; pubescence black, golden on the segmentations; venter yellowish-brown, flecked with black, pubescence pale.

Legs.—Coxæ, femora, and tibiæ yellowish-brown, tarsi darker, coxæ with pale pubescence, that on femora pale above and black beneath, tibiæ and tarsi with black pubescence.

Wings.—Clear, veins yellowish-brown; stigma inconspicuous; first posterior cell slightly narrowed at the border. Halteres pale.

Obs.—Described from two almost perfect specimens and unlike any other *Diatomineura* known to me and does not fit the descriptions of other species. It is somewhat similar in build to *Erephopsis gibbula*, Walker.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

DIATOMINEURA BICOLORATA, *sp. nov.*

♂. Length, 11, ♀ 11; width of head, ♂ 4, ♀ 4 (vix); length of wing, ♂ and ♀, 10.75; proboscis, ♂ 5, ♀ 4.75 mm.

A small compact species. Antennæ and palpi reddish-yellow; thorax black; abdomen yellowish-red; apical segments black; legs reddish-brown; wings with cross-veins shaded.

♂. *Head*.—Face reddish-yellow, convex, pubescence black and pale, dense; cheeks with grey tomentum and dark pubescence, groove between cheeks and face shallow; first two joints of antennæ pale reddish-yellow with long black pubescence, third joint red, apex black; palpi yellowish-brown, first joint short, swollen, second joint tapering to a fine point, pubescence at apex black, elsewhere yellow; beard yellowish, dense; eyes densely pubescent.

Thorax.—Black, reddish above the wing roots, tomentum brown, pubescence yellow and black, dense; lateral borders with black pubescence, orange above the wing roots; scutellum similar to thorax; pleuræ with grey-brown tomentum and grey pubescence, orange colored beneath the wings.

Abdomen.—First three segments yellowish-red, third flecked with black, remaining segments black, segmentations yellowish-red, second and third segments with median, oblong, dark brown plugs, pubescence black,

lateral pubescence on first three segments orange mixed with black, black on fourth, cream colored on remaining segments; venter with basal portion pale yellowish with a median, narrow, black stripe, rest black, pubescence mixed pale and black.

Legs.—Reddish-brown, coxæ and tarsi darker, pubescence black, very long on under surface of femora.

Wings.—Posterior half shaded yellowish-brown; cross-veins at the apex and base of the discal cell and the base of the anterior branch of the third long vein shaded brown, rest of wing grey; stigma pale, inconspicuous; appendix rudimentary.

♀. Similar to the ♂. First joint of the palpi hidden by pubescence, second reddish-yellow, concave on upper margin, ending in an obtuse point. Front black, tomentum ash-grey, pubescence black, vertex about half the width of the base, no callus present.

Obs.—A species related to *D. regis-georgii*, Mihi, but distinguished from it by the shaded posterior border and cross-veins of the wings and the different abdomen. The clothing on the pleuræ of the thorax is also brighter.

Hub.—King George Sound, Western Australia. (Collector.—G. Masters).

DIATOMINEURA PLANA, Walker.

List. Dipt., i. (1848), p. 144; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 32.

Hub.—King George Sound, Western Australia. (Collector.—G. Masters).

DIATOMINEURA LESIACEA, Macquart.

Dipt. Exot., i. (1838), p. 103; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 31.

Hub.—South Australia.

DIATOMINEURA CONSTANS, Walker.

Dipt. Saund., i. (1850), p. 15; Ricardo, Ann. Mag. Nat. Hist. (8), xix. (1917), p. 208.

Hub.—Tasmania.

DIATOMINEURA INFLATA, Ricardo.

Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 34.

Hub.—Hastings River, (Collector and donor.—A. R. McCulloch); Coomeroo, New South Wales.

Mr. Tillyard has also taken this species at Kendall, New South Wales.

CORIZONEURA CHRYSOPHILA, Walker.

List. Dipt., i. (1848), p. 155; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 36.

Hub.—Sydney, New South Wales. (Collector and donor.—E. P. Ramsay).

CORIZONEURA FULVA, Macquart.

Dipt. Exot. Suppl., iv. (1850), p. 19; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 36.

Obs.—One of the specimens is ticketed "Australia."

Hub.—Sydney, New South Wales.

SILVIUS AUSTRALIS, Ricardo.

Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 263.

Obs.—A single specimen contained in the collection does not allow of definite determination on account of its poor state of preservation, but it is almost certainly this species.

Hab.—Gayndah, Queensland. (Collector.—G. Masters).

SILVIUS FERGUSONI, Ricardo.

Ann. Mag. Nat. Hist. (8), xix. (1917), p. 214.

A ♀ specimen contained in the collection does not altogether agree with Miss Ricardo's description in that the eyes are thinly pubescent. The abdomen has median white triangular spots on segments one to four inclusive with faint grey tomentose banding on segments three and four and broad apical lateral spots on segments two to four. The sub-callus also bears a deep median longitudinal groove. The wings are uniformly blackish-brown; a small appendix present. Length, 14 mm.

Obs.—It is considered inadvisable to more than make the above note until the specimen has been compared with an authentic specimen of *S. fergusoni*, Ricardo.

Hab.—Norton's Basin, Nepean River, New South Wales. (Collector and donor.—A. Musgrave).

SILVIUS MINOR, sp. nov.

♂. Length, 10-10.5; width of head, 3-3.5; length of wing, 10 mm.

A small brown species with spotted wings. Thorax, abdomen and legs reddish-yellow.

Head.—Face, reddish-yellow, cheeks darker, pubescence black with a few pale scattered hairs; beard grey, scanty; antennæ golden yellow, apical annuli red-brown, second segment about half the length of the first, pubescence black, scanty; first joint of palpi yellowish, very short, swollen, second joint long, slender, ending in a blunt point, about four times the length of the first, pubescence black; eyes bare; ocelli prominent.

Thorax.—Black, covered with yellowish-brown tomentum and pale pubescence, lateral borders with pale pubescence; scutellum paler than thorax, posterior border with pale pubescence; pleuræ dark yellowish-brown, pubescence pale.

Abdomen.—Uniform dark yellowish-brown, with indistinct grey tomentose bands, pubescence pale; venter similar to dorsum.

Legs.—Coxæ reddish-brown; femora, tibiæ and tarsi honey-yellow, pubescence pale.

Wings.—Tinged brown, with darker spots at the base and apex of the discoidal and apex of the inferior basal cells, these cells, the anal and the axillary cells almost clear; veins brown; stigma brown, inconspicuous; no appendix present.

Obs.—The thorax of the two specimens before me is more or less abraded but sufficient thoracic clothing remains in the type to show its nature. It is a very distinct species and may be separated from *S. doddii*, Ricardo, and *S. lunulatus*, Bigot, by its thorax, abdomen, legs, wings; the palpi are also distinctive.

Hab.—South Australia.

SILVIUS NIGRIPENNIS, Ricardo.*SILVIUS ATER*, Taylor.

Ann. Mag. Nat. Hist. (8), xix. (1917), p. 213; Taylor, Proc. Linn. Soc., N. S. Wales, xli. (1917), p. 751.

S. nigripennis takes precedence as it appeared in February whilst *S. ater* was not published until April.

Hub.—Claudie River, Queensland. (Collector.—J. A. Kershaw); Brock's Creek and Mary River, Northern Territory. (Collector.—G. F. Hill).

SILVIUS DODDI, Ricardo.

Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 261.

Hub.—Gayndah, Queensland. (Collector.—G. Masters).

ECTENOPSIS AUSTRALIS, Ricardo.

Ann. Mag. Nat. Hist. (8), xix. (1917), p. 217.

Length, ♂ 11.5, ♀ 10.5-11; width of head, ♂ 3.5, ♀ 2-2.5; length of wing, ♂ 10, ♀ 10-10.5 mm.

Two ♀ specimens and a ♂ in the collection differ somewhat from the description of this species which is stated to be somewhat variable in the legs.

♂. Abdomen as in description; legs black, except basal half of femora reddish-yellow, femur, tibiae and first tarsal of the middle right leg pale reddish-yellow, remaining tarsi dusky; antennæ as described, third joint missing.

♀. Second and third divisions of antennæ raw-sienna; median thoracic stripe uniformly broad, broader than the lateral stripes; no triangular median spots on the second to fourth segments of abdomen; appendix of wing variable in length; legs as in type.

Obs.—Judging from the description of this species and the specimens before me this would appear to be a variable species. The differently colored mid right leg in the ♂ is curious as it belongs without doubt to the specimen under review. The dimensions of these specimens is given as they were omitted from the description of the type.

Hub.—Gayndah, Queensland. (Collector.—G. Masters).

ECTENOPSIS VULPECULA, Wiedemann.

Ausszweifl. Ins. i. (1828), p. 195 (Chrysops); Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 266.

Hub.—Gayndah, Queensland. (Collector.—G. Masters).

Var. *NIGRIPENNIS*, var. nov.

♀. Length, 11; width of head, 3; width of front of vertex, 0.5; length of wing, 9.5 mm.

Palpi black, base raw-sienna, pubescence black, beard very scanty, golden; first and second segments and first two divisions of the third joint of the antennæ reddish-brown, rest black; pubescence black, sparse; wings dusky, veins deep black; stigma black; appendix short. Legs: coxæ raw-sienna, femora, tibiae and tarsi black, pubescence black.

Obs.—Represented by a single specimen in the collection. It differs from *E. vulpecula*, Wied., in the above details which do not appear to be sufficient to raise it to specific rank. It is abundantly distinct from *E. australis*, Ricardo.

Hub.—Norton's Basin, Nepean River, New South Wales. (Collector.—A. Musgrave).

Sub-family TABANINÆ.

Group vii. Abdomen with one or more stripes, usually continuous.

TABANUS PARVICALLOSUS, Ricardo.

Ann. Mag. Nat. Hist. (8), xvi. (1914), p. 394.

Hub.—Gayndah, Queensland. (Collector.—G. Masters).

Group viii. Species with median or lateral spots, or both, on abdomen, not usually forming a continuous stripe.

TABANUS SPOLIATUS, Walker.

Proc. Linn. Soc., iv. (1860), p. 103; Ricardo, Ann. Mag. Nat. Hist. (8), xv. (1915), p. 275.

Obs.—The collection contains a single ♂ specimen determined as this species by Miss Ricardo from Victoria (no definite locality being given). It seems remarkable that a species described from Macassar, and the Celebes, being unknown from Northern Australia where its presence might be expected, should be found in Victoria.

Hub.—Victoria.

TABANUS VICTORIENSIS, Ricardo.

Ann. Mag. Nat. Hist. (8), xv. (1915), p. 275.

Obs.—The collection contains two specimens, one of which, determined by Miss Ricardo, is in rather a poor state of preservation, the thorax and abdomen being abraded. The second specimen is clearly this species and is in a good state of preservation.

Hub.—Moonbar, (Collector—R. Helms); Blackheath, New South Wales. (Collector and donor.—A. Musgrave).

Group ix. Species with paler bands, and sometimes spots on abdomen.

TABANUS MUSGRAVII, sp. nov.

♀. Length, 11; width of head, 4; width of front of vertex, 0.25; length of wing, 11 mm.

A small compact black species. Antennæ dark reddish-brown, apices black. Palpi reddish-yellow. Thorax black. Abdomen black with grey bands. Legs blackish.

Head.—Face, cheeks and sub-callus grey-black; beard grey, scanty; front black, uniform in width, pubescence black, short and scanty; frontal callus shining black, tumid, pear-shaped, reaching the eyes, with a lineal extension, about as long as the plug, not reaching the vertex; eyes dull black, with copper-colored patches in some lights; antennæ dark reddish-

brown, annuli black, tooth very small on expanded basal portion, pubescence black and scanty on first and second segments; palpi reddish-yellow, pubescence black; proboscis very short, black.

Thorax.—Dark grey-black, with short, scanty, mixed dark and pale pubescence, sides with dense, fairly long grey-black hairs; scutellum similar to thorax with some scanty grey pubescence; pleuræ grey-black with fairly long grey hairs.

Abdomen.—Dull black, densely clothed with appressed black hairs, segmentations grey with grey pubescence and faint pale creamy median spots on the first four segments, lateral margins of the first six segments grey, diminishing in size toward the apex; venter grey with whitish pubescence, segmentations distinct.

Legs.—Black, femora with fairly dense and long grey pubescence, black on tibiæ and tarsi, longest on the tibiæ.

Wings.—Grey; veins black; stigma dark yellowish-brown; no appendix.

Type.—Unique. It may be distinguished from *T. kershawi*, Ricardo, by its differently colored antennæ, its sub-callus not shiny, the uniform front and the wings. Differs from *T. griseoannulatus*, Taylor, in its larger frontal callus; the first and second joints of the antennæ being uniform in color and the absence of an appendix on the wings.

Hab.—Underbank, New South Wales. (Collector and donor—A. Musgrave, Dec. 1915)

TABANUS MACQUARTI, Ricardo.

Ann. Mag. Nat. Hist. (8), xv. (1915), p. 277.

Hab.—South Australia.

Group x. Species with the abdomen unicolorous, or almost so, sometimes darker at the apex.

TABANUS DIMINUTUS, Walker.

List. Dipt., i, (1848), p. 183; Ricardo, Ann. Mag. Nat. Hist. (8), xv. (1915), p. 285.

Obs.—There seems little doubt that the specimen before me is referable to this species. There are a few points of disagreement with Miss Ricardo's description of Walker's type, but it is said to be in a poor state of preservation. The third joint of the antennæ is blackish-brown instead of tawny and the frontal callus is a small, almost circular, light brown plug without a lineal extension.

Hab.—Gayndah, Queensland. (Collector.—G. Masters).

TABANUS SANGUINARIUS, Bigot.

Mém. Soc. Zool. France, v. (1892), p. 675; Ricardo, Ann. Mag. Nat. Hist. (8), xv. (1915), p. 287.

Hab.—South Australia.

Group xi. Species with pubescence on the eyes (*Theriopteles*).*TABANUS IMPERFECTUS*, Walker.

List. Dipt., i. (1848), p. 179; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 278.

♂. Length, 10; width of head, 3.5; length of wing, 8 mm.

Antennæ, palpi and thorax similar to ♀. Abdomen with a grey basal band on the second segment in addition to the posterior band; tibiæ blackish, first tarsals black. Wings grey; veins and stigma black; appendix present.

Hab.—Wedge Bay, Tasmania. (Collector and donor.—G. H. Hardy).

TABANUS RAINBOWI, sp. nov.

♂. Length, 11.5; width of head, 4; length of wing, 10 mm.

A small species with black thorax. Abdomen orange-rufous with a broad black stripe the whole length gradually tapering to the apex. Legs orange-rufous. Wings faintly yellow.

Head.—Face and cheeks black, dark reddish-brown round the base of the antennæ; sub-callus dark reddish-brown; first and second joints of the antennæ reddish-yellow, with dense black pubescence, third joint wanting; palpi light yellowish-brown, second joint swollen and longer than the first, ending in a blunt point; pubescence long and black with a few long grey hairs in addition on the first joint; eyes black, facets small, densely covered with short grey pubescence; beard dense, grey, with scattered black hairs.

Thorax.—Black, clothed with long, erect black hairs; sides orange-rufous, with long black pubescence from the wing roots to the apex of the shoulders; scutellum black, pubescence black; pleuræ black with scattered grey hairs.

Abdomen.—Orange-rufous; first segment black, apical margin orange-rufous, black in the centre, remaining segments, except the last, with large black median spots gradually tapering in width to the apex and forming a continuous stripe, apical segment orange-rufous; pubescence black, golden on the segmentations, the black hairs are long on the sides; venter orange-rufous, pubescence mixed grey and black.

Legs.—Coxæ black, with long black pubescence, basal half of femora black, rest orange-rufous; tibiæ orange-rufous, apices black; fore and mid tibiæ almost wholly black, hind tarsi with the apices black, pubescence black, femora with long grey pubescence beneath.

Wings.—Clear; veins yellowish-brown; stigma yellowish; no appendix present.

Obs.—Described from a single specimen, most nearly related to *T. basalis*, Walker, but may be distinguished by the densely pubescent eyes, the sides of the thorax being orange-rufous, the orange-rufous venter, the legs and the absence of an appendix on the wings.

It affords me much pleasure to associate the name of my friend, Mr. W. J. Rainbow, with this species.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

TABANUS CIRCUMDATUS, Walker.

List. Dipt., i. (1848), p. 181; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 280.

Obs.—The West Australian specimens evidently belong to this variable species. When compared with a specimen kindly determined for the writer by Mr. Austen by comparison with the type, the only noticeable differences are that the eyes are more hairy and the legs paler.

Hab.—Jindabyne and Moonbar, New South Wales. (Collector.—R. Helms); King George Sound, Western Australia. (Collector.—G. Masters).

TABANUS VETUSTUS, Walker.

List. Dipt., i. (1848), p. 179; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 277.

Hab.—King George Sound, Western Australia (Collector.—G. Masters).

TABANUS ANTECEDENS, Walker.

List. Dipt., i. (1848), p. 178; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 279.

Hab.—Wentworth Falls, New South Wales. (Collector.—A. Musgrave).

TABANUS EDENTULUS, Macquart.

Dipt. Exot., Suppl., i. (1846), p. 34; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 281; White, Papers and Proc. Royal Soc. Tasmania (1915), p. 10.

Hab.—Hobart, Tasmania (Collector.—G. H. Hardy).

TABANUS HOBARTIENSIS, White.

Papers and Proc. Royal Soc. Tasmania (1915), p. 13.

Obs.—Represented by a single specimen which does not very well agree with this species, but till further material is available it is considered better to leave it under the above name.

Hab.—Tasmania.

TABANUS NEOBASALIS, Taylor.

Tabanus basalis, Walker, ♀, List. Dipt., i. (1848), p. 182, *nomen bis lectum*; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 282.

Obs.—A change of name becomes necessary for this species as *basalis* was previously used by Macquart¹.

TABANUS GENTILIS, Erickson.

Archiv. f. Naturgesch., viii. (1842), p. 271; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 286.

Obs.—The specimen from Barrington Tops has the apex of the anal cell slightly shaded brown, but not the stem. It is quite typical in other respects.

Hab.—Barrington Tops, 4,600 ft., New South Wales; (Collector and donor.—A. Musgrave); King George Sound, Western Australia. (Collector.—G. Masters).

¹ Macquart—Dipt. Exot., i. (1) (1838), p. 130, for a different species belonging to Group vi from East India.

TABANUS PSEUDOBASALIS, sp. nov.

♀. Length, 12.25-13; width of head, 4.75-5; length of wing, 10-11 mm.

A small black species with pale antennæ and palpi; thorax black; abdomen yellowish; legs reddish-yellow; wings clear.

Head.—Face and cheeks with creamy-yellow tomentum and pale pubescence; front paler with golden pubescence, broader anteriorly, about two and a half times as long as broad, no frontal callus; first two joints of antennæ yellow, pubescence pale, a few black hairs on the apices, third joint bright reddish-yellow, the base with a sharply defined obtuse angle; palpi cream-colored, tapering to a fine point, pubescence pale, first joint with dense creamy pubescence; beard cream-colored; pubescence on eyes very slight.

Thorax.—Black with golden pubescence, shoulders yellowish, lateral pubescence pale; scutellum similar to thorax, pubescence on anterior border long; pleuræ pale, flecked with black, pubescence pale.

Abdomen.—Yellowish-brown, darker towards apex, pubescence golden, with scattered black hairs towards the apex; venter yellowish-brown, tomentum grey.

Legs.—Reddish-yellow, tarsi darker, coxæ with long pale pubescence, short and black elsewhere.

Wings.—Clear; veins yellow-brown; stigma yellow; a small appendix present.

Obs.—This species is in some respects not unlike *T. basalis*, Walker, but it is distinguished by the golden pubescence on the thorax and abdomen, the cream-colored face, the absence of stripe on the abdomen and there being no frontal callus.

Hab.—King George Sound, Western Australia. (Collector.—G. Masters).

TABANUS INDEFINITUS, sp. nov.

♀. Length, 11-11.5; width of head, 4-4.5; length of wing, 10 mm.

A small black species with reddish antennæ; palpi dusky; thorax black; abdominal pubescence black, segmentations golden; legs black, base of tibiæ yellowish; wings clear.

Head.—Face grey, cheeks buff, pubescence grey; beard white; front dark grey, shining black when denuded, pubescence black, vertex black, slightly wider anteriorly; frontal callus shining black, as wide as front, resting on the sub-callus, and with a short broad extension; eyes slightly pubescent; first two joints of antennæ and expanded portion of the third reddish-brown, annuli black, pubescence on first joint pale and black, black on the second, base of third broad, angle small, no tooth; palpi dark, tapering to a fine point, with dense grey pubescence.

Thorax.—Black with three brown stripes, tomentum grey, densely clothed with erect black and appressed golden hairs, shoulders pale reddish, with black hairs and dense grey ones beneath; scutellum similar to thorax, posterior border with long golden pubescence.

Abdomen.—Black with black pubescence, posterior borders of segments pale with golden pubescence and median, apical, triangular golden spots on segments one to five, segments broadly pale laterally,

second more so than first, and clothed with golden hairs; venter blackish, dark reddish-brown towards the apex, tomentum grey, pubescence pale, golden laterally.

Legs.—Femora and tarsi black, basal two thirds of fore and basal third of hind tibiæ pale reddish-yellow, rest black, mid femora, pale reddish-yellow, pubescence black.

Wings.—Clear, very faintly clouded yellow on the cross-veins at the base of the discal cell; veins dark brown; stigma yellowish, inconspicuous; a long appendix present; base of wings tinged yellow; halteres dark brown, apices yellow.

Obs.—A small but striking species on account of the golden dorsal pubescence. It may be distinguished from *T. antecedens*, Walker, by the thoracic and abdominal ornamentation and the tibiæ. There is also a certain resemblance to *T. oculatus*, Ricardo, in the thoracic clothing but it appears to be distinct.

Hub.—Glenbrook Creek and Norton's Basin, Nepean River, New South Wales. (Collector and donor.—A. Musgrave, Oct 1915).

Two other specimens also from New South Wales—one from Dunedoo, the other from Sydney may possibly belong to this species but differ in some essentials, and may be characterised as follows:—

Var. A. Antennæ bright reddish-brown, annuli black; palpi paler than in the type; abdomen reddish-brown, except the first and last three segments blackish, segmentations pale; second segment with a median black spot not reaching the posterior margin and segments two to five with indistinct apical grey triangular spots.

Hub.—Dunedoo, New South Wales. (Collector.—W. W. Thorpe, 1/17).

Var. B. Antennæ entirely pale reddish-brown; palpi creamy, and the abdomen similar to *Var. A*. but lacking the apical triangular spots on the abdomen.

Obs.—I am disinclined to separate these specimens as distinct species in the absence of more specimens, as they resemble the typical form too closely in shape, color of legs and thorax. The wings are also similar to the type.

Hub.—Sydney, New South Wales. (Collector and donor.—A. Musgrave).

TABANUS POSTPONENS, Walker.

List. Dipt., i. (1848), p. 179; Ricardo, Ann. Mag. Nat. Hist. (8), xvi. (1915), p. 282.

♂. Length, 13; width of head, 5; length of wing, 12 mm.

Head.—Face and cheeks grey-black, tomentum and pubescence grey; beard white; first two joints of antennæ blackish; pubescence black, third wanting; palpi, first joint dark reddish-brown, slender, second joint swollen, pale reddish-yellow, pubescence mixed pale and black; eyes with dense pale pubescence, facets black and brown, the latter occupying the upper two-thirds, except for a narrow border of black ones circling the eyes above.

Thorax.—Black, partially denuded, with a few scattered black hairs, sides with long pale ones; scutellum similar, posterior margin with pale hairs; pleuræ black, tomentum grey, pubescence pale.

Abdomen.—Reddish-brown, darker toward the apex, the grey tomentose bands narrow with faint indications of median grey triangular spots; venter reddish-brown, segmentations grey.

Legs.—Dusky, base of tibiae reddish.

Wings.—Clear; veins and stigma yellowish-brown; a small appendix present.

Obs.—Notwithstanding certain discrepancies with the description of this species, which may be sexual, it is considered preferable to place the above specimen under this species. It is the first time the ♂ has been described.

Hab.—Gayndah, Queensland. (Collector.—G. Masters).

TARANUS BRISBANENSIS, *Taylor*.

Proc. Linn. Soc. N.S.Wales, xlii. (1917), p. 526.

Hab.—Queensland.

ON THE OCCURRENCE OF THE CRESTED PENGUIN
(*EUDYPTES CHRYSOCOME*) IN AUSTRALIA,

with Notes on its Range, and on the History of its Original Discovery.

BY

A. F. BASSET HULL, Hon. Ornithologist.

(Plates x.-xi.)

Early in December, 1917, a Crested Penguin (*Eudyptes chrysocome*, Forster) was taken alive in Broken Bay, New South Wales, this being the first recorded occurrence of the species in this State. Mr. C. F. Rane, who resides at Balmain, has supplied me with the following graphic account of the incident :—

"I captured the bird at Ettalong Beach on 5th December, 1917, whilst fishing from the rocks at the southern end of the Beach, nearest to Barrenjoey, I do not know the name of the headland. While looking towards Ettalong Village, I saw, what appeared to me to be, a Mollyhawk, some two or three hundred yards along the beach, riding on the breakers. At the same time the bird gave a call resembling the screech of a goose. I then answered it, imitating the call. The bird then made one dive and came up within ten feet of where I stood. A heavy sea then caught the bird and swept it in close to the beach. I jumped into the water between the bird and the open. It then made a dive for the open water, but came straight at me. I made a clutch and caught it by the neck, and after keeping it for a few days, I sent it to the Zoological Gardens at Taronga Park."

Mr. A. S. Le Souef, Director of the Gardens, informed me that the Penguin appeared to be in good health when received, and lived contentedly enough in the Seal Pond. After about ten days it showed signs of moping and would not eat. It died a few days afterwards, and the body was sent to the Australian Museum. The skin is preserved there, and the following is a description :—

Immature male. The whole upper surface dark brown, the centre of the feathers bluish-black. A few shreds of down adhering below the neck. Superciliary stripe extending from culminicorn over the eye, $3\frac{1}{2}$ inches in length, whitish to behind eye, then pale sulphur-yellow. Chin and upper throat light brown, lower neck and rest of under surface white. Wings, brownish, tipped with white except at the extremities. Under surface of wings white with an irregular black margin. Feet, fleshy-white; toes, black; bill, reddish horn colour. Total length 27 inches. Wing, 7 in.; foot (bare to end of middle toe), $4\frac{3}{4}$ in.; middle toe, $1\frac{1}{2}$ in.; bill, 2 in.; latericorn, $1\frac{1}{4}$ in.; lower mandible, $2\frac{1}{4}$ in. (Plate x., fig. 1).

Some earlier records of the occurrence of this species in Tasmania and Australia are as follows :—

Gould says¹ :—"For a fine example of this singular Penguin I am indebted to my friend, Ronald C. Gunn, Esq., of Launceston, Van Diemen's Land, who informed me that it had been washed on shore on the northern coast of that Island after a heavy gale. It is less plentiful in

¹ Gould—Birds of Australia (folio), 1848.

that part of the world than in many others, for although it is occasionally found on the shores of Van Diemen's Land and the south coast of Australia, its great strongholds are the islands of Amsterdam, St. Paul's, and Tristan d'Acunha. As I had no opportunity of seeing the bird in a state of nature, I cannot perhaps do better than transcribe the account given by Latham, who states that 'it is called Hopping Penguin . . .'

In 1887, the Field Naturalists' Club of Victoria organised an expedition to King Island, Bass Strait. In a list of the birds identified by Members of the Club, Campbell² notes *Catarractes chrysocome*, Latham, a skin having been obtained. In his "Nests and Eggs"³ Campbell states that this Crested Penguin was captured alive among the rocks on King Island.

In a tabulated list of the birds of Western Australia⁴ Campbell includes *Catarractes chrysocome* amongst "fifteen species of birds now recorded for the first time as West Australian." This species is noted "near Hamelin Harbour (Tomb)." Mr. Campbell informs me that he did not see the specimen, but recorded it on the authority of Mr. Hugh Tomb, the manager of a timber station—the Karri Timber Company (Davies) near Hamelin Harbour, and from what he can recollect of the information given him by Mr. Tomb, the bird was secured alive. Campbell's tabulated list shows the extra-West Australian range of the birds named, and *C. chrysocome* is noted as found in the Northern Territory, New South Wales, Victoria, South Australia and Tasmania. Ramsay's tabulated list⁵ gives the range of *C. chrysocome* as Gulf of Carpentaria, New South Wales, Victoria, South Australia and Tasmania.

Under date 2nd August, 1909, Mr C. P. Conigrave⁶ states that an interesting find recently made on Rottnest Island, twelve miles north-west of Fremantle, Western Australia, was a specimen of the Crested Penguin (*Catarractes chrysocome*) which was picked up by Mr. Miller of the Rottnest Signal Station. Mr. Otto Lippert, the taxidermist of the Western Australian Museum, happened to be collecting on the Island, and he at once prepared the skin.

In February, 1910, a specimen of the Crested Penguin made its appearance on the beach at Lorne, on the south coast of Victoria.⁷ When first seen by the members of a cray-fishing party it was on the rocks at the water's edge, but it followed them over some hundreds of yards of rocks and sand. They placed it in a bag and carried it to their residence, where it was domiciled in a large sea-bath, about twenty yards square, where it lived for six weeks. During the first fortnight it was very savage and spent most of its time in the dark recesses of a bathing box, where it underwent a complete moult. The moult finished at the head, and some of the discarded crest feathers measured as much as four inches

² Campbell—List of Birds identified by the Field Naturalists' Club of Victoria, King Island, 1887 (*Vict. Nat.*, iv., 1887-8, p. 188).

³ Campbell—Nests and Eggs of Australian Birds, 1901.

⁴ Campbell—List of West Australian Birds (*Proc. R. Soc. Edinb.*, xvii., 1889-90, p. 390).

⁵ Ramsay—Tabular List of Australian Birds, 1888.

⁶ Conigrave—*Emu*, ix., 1909, p. 93.

⁷ Nicholls—Notes on the Crested Penguin (*Catarractes chrysocome*) (*Emu*, x., 1910, p. 41).

in length. After the moult the colour of the crest was bright sulphur-yellow. The bird had no power of erecting this crest, but at times, when teased, the feathers of the head showed up slightly. From Dr. Brooke Nicholls' interesting account, this bird had evidently reached its full plumage before capture, as the length of the discarded crest feathers indicates. It became very tame, and was christened "Billy." This name was given him, Dr. Nicholls informs me, on account of the eagerness with which he answered the call to meals given by rattling a stick on the "billy" in which the small fish were brought to him. "One morning Billy followed some bathers to the beach, a distance of about half a mile from the house. He made strenuous efforts to keep up with the party going across the loose sand, but, finding himself being left behind, uttered such loud 'squawks' of distress that he had to be carried. On reaching the bathing site, the members of the party donned their bathing attire and made for the open ocean, with Billy following. A heavy surf was running, and as we entered the water Billy paused. Wading further and further out we called to him, and he made an attempt to follow, but was swept off his feet and washed ashore by the foaming water, which was not more than eight or nine inches deep. At length, after being knocked down and buffeted by several successive waves he managed to struggle into water about a foot deep, and then, swimming swiftly, shot like an arrow towards us. Once in the breakers the bird had all the best of it, and we dived and chased after him through the waves as one might romp with a dog ashore. Tiring of the sport, Billy commenced to dive and hunt for fish, and gradually went out to sea. We called to him by name, and, turning his head, he answered once or twice with a loud squawk, but kept paddling oceanwards all the time. He had suddenly realised that he was once again in the open ocean, and not confined by the four cemented walls of a bath. The sea had called to him and he had obeyed." I am indebted to Dr. Brooke Nicholls for the photograph of Billy in the bath house, reproduced in Pl. xi., fig. 1.

In September, 1913⁸ a specimen of the Crested Penguin came ashore between the Mersey and Don Rivers, not far from Devonport on the north coast of Tasmania. Mr. H. Stuart Dove says:—"This is the first Crested Penguin I have ever seen in the north of the Island, although two or three have been taken in the south, where one would naturally expect to see those which have strayed from the Antarctic Islands which are their home. The specimen in question was in splendid order, evidently only just deceased, and had escaped the battering of the reefs; stuffed and mounted, he forms a conspicuous addition to my collection of natural curiosities. He evidently had another moult to undergo before reaching maturity, the measurements and colouring not quite agreeing with those given by the authorities for an adult. In my specimen I should describe the upper surface as a fine dark metallic blue, upper surface of wings the same, tail somewhat lighter blue; under surface, silvery white, *except the throat and chin, which are ashy-white, with a small dark patch a little below the base of beak.* Sides of the head below the crest, a darkish grey; forehead, bluish-grey. The wings above are of the same

⁸ Dove—The Crested Penguin (*Notarhactes chrysocome* Forster), in *Australian Waters* (*Ibis* (10), iii., 1915, p. 87).

tint as the back; beneath, white, with broad patch of dark blue at the tips, the same at the base, extending somewhat on to body in front of wing; there is also a border of dark blue on the upper edge, but not extending to the tip. Beak, dark red; feet, reddish, webbed, with strong nails. The tail is long for a Penguin, and formed of stiff, narrow feathers. The crest is black, formed of fine pointed feathers, the pale yellow appearing only underneath, and beginning behind the eye. Total length, 24 inches; wing, 6 in.; tail, 3 in.; foot (on flat, with tarsus), 4.5; beak, 2 in.; crest 3 in.

Mr. Dove has furnished me with a photograph of this bird, stuffed and mounted (Pl. xi., fig. 2).

Mathews⁹ introduced *Penguinus*, Brunnich, to replace *Catarractes*, Brisson, but later (with Iredale),¹⁰ he accepted the dictum of his reviewer, "J.A.A." in "The Auk," rejected *Penguinus* and adopted the genus *Eudyptes*, Vieillot, for the Crested Penguins.

Taking *Eudyptes chrysocome*, Forster (the Crested Penguin) as the dominant species, Mathews and Iredale grouped *E. pachyrhynchus*, Gray, the Victoria Penguin, *E. sclateri*, Buller, the Big-crested Penguin, and *E. filholi*, Hutton, the Campbell Island Crested Penguin, as sub-species. They separated *E. schlegeli*, Finsch, the Macaroni Penguin, as a dominant species, and stated that "the Macquarie Island, *P. schlegeli*, is the New Zealand representative (but seemingly specifically distinct) of the Falkland Island, *P. chrysolophus*." [The initial *P.* (*Penguinus*) is evidently written in error for *E.* (*Eudyptes*)]. The New Zealand range of the varieties of the Crested Penguin according to these authors is as follows:—

E. chrysocome (Tasmania), New Zealand (? breeding on the south-west coast): Antipodes Island (breeding): ? Macquarie Island (breeding).

E. pachyrhynchus. New Zealand Seas: Snares Island (breeding).

E. sclateri. New Zealand Seas: Auckland Island (breeding) ? Bounty Island (breeding).

E. filholi. Campbell Island (breeding).

Almost synchronously¹¹ Mathews gives *E. pachyrhynchus*, Gray, as the Australian representative of the species. As he adopted Forster's Tasmanian bird as the type of the species, the inclusion of the New Zealand variety in the Australian list is apparently an error.

The Australian range of the Crested Penguin is given by various authors as follows:—

Ramsay.¹² Gulf of Carpentaria, New South Wales, Victoria and South Australia, Tasmania.

Campbell.¹³ Coasts of New South Wales, Victoria, South and West Australia, Tasmania.

⁹ Mathews—On some necessary alterations in the Nomenclature of Birds (*Novitates Zoologicae*, xvii., 1910, p. 497).

¹⁰ Mathews and Iredale—A Reference List of the Birds of New Zealand. Pt. i. (*Ibis* (10) i., 1913, p. 219).

¹¹ Mathews—A List of the Birds of Australia, 1913.

¹² Ramsay—Tabular List of Australian Birds, 1898.

¹³ Campbell—Nests and Eggs of Australian Birds, 1901.

Hall.¹⁴ Regions 5 (Tasmania) and 6 (Western Victoria and South Australia).

Littler.¹⁵ Tasmania, South Australia.¹⁵

Mathews.¹⁶ Australian Seas.

Lucas and Le Souef¹⁷. South Australia, Tasmania.

Forster's *Aptenodytes chrysocome* having been definitely accepted as the type of the Australian representative of the species, it is desirable to discuss the author and the material upon which he founded the species.

John Reinold (sometimes spelt Reinhold or Reynold) Forster and his son George, arrived in England from Germany in 1767. He became associated with Joseph Banks, Lord Sandwich, and Cook, the great navigator.¹⁸ As soon as it was known that Mr. Banks had withdrawn from Cook's proposed second expedition, Forster applied for the appointment of Naturalist for the voyage, and having secured the interest of Lord Sandwich, he obtained the position. He was to receive the £4,000 which had been granted by Parliament to secure the services of Dr. Lynd. His son, a youth of eighteen, accompanied him as his assistant.¹⁹

Captain Cook²⁰ in describing the personnel of his second expedition, says:—"It being thought of public utility, that some person skilled in Natural History should be engaged to accompany me in this voyage, the parliament granted an ample sum for that purpose, and Mr. John Reinhold Forster, with his son, were pitched upon for this employment."

Forster did not prove an agreeable companion, and fell out with most of his fellow voyagers. In particular, William Wales, the astronomer to the expedition, was very scathing in his comments upon the naturalist, his personal qualities and qualifications.²¹

Upon his return from the voyage, some disagreement arose with regard to the manner in which Forster's scientific observations were to be incorporated in the narrative of the expedition for publication. This culminated in an order directed by Lord Sandwich to Forster, forbidding him to publish anything relating to the voyage. Notwithstanding this prohibition, Forster published²² an account of the voyage under his son's name.

¹⁴ Hall—A Key to the Birds of Australia, 1906.

¹⁵ Littler says "This dweller on the lonely Islands of the Southern Ocean is very seldom seen round the coast of Tasmania. A few specimens have been taken round the Southern Coast, and one or two in Bass Strait." (*The Birds of Tasmania*, 1910).

¹⁶ Mathews—The Birds of Australia, i., 1910.

¹⁷ Lucas and Le Souef—The Birds of Australia, 1911.

¹⁸ Lichtenstein—Descriptiones animalium, etc., 1844 (preface).

¹⁹ Kitson—Captain James Cook, 1907, p. 238.

²⁰ Cook—A Voyage towards the South Pole, and Round the World, etc., 1779 (gen. introd., p. xxxiv.)

²¹ Walden—Remarks on Mr. Forster's Account of Captain Cook's last Voyage Round the World, etc., 1778.

²² Forster—A Voyage round the World in His Britannic Majesty's Sloop Resolution, etc., 1778.

From the foregoing an impartial judgment can easily be arrived at as to the personal characteristics of the Author. Now as to the material upon which he founded his *Aptenodytes chrysocome*.

In 1781 he published an account of the "*Aptenodytes*, a family of birds peculiar to the Southern Hemisphere."²³ From his introductory remarks, I translate the following²⁴:—

"During the voyage to the Southern Hemisphere which I undertook with the able and distinguished navigator, James Cook, who has been taken from us by an untimely death, I had the opportunity of seeing a great many species of this family, and of examining their habits and nature with considerable care. In the case of only two species have I described the skins of dead birds; one species, which I have never seen, has become known to me only from Edwards' plate. Consequently, hardly anyone could be better qualified to discuss this family of birds, whether by reason of knowledge or of being an eye witness, than myself and my son, George Forster. May I, therefore, be allowed to introduce to ornithology the new genus of the *Aptenodytes* (wingless divers), and to communicate their history to the learned world as far as I was able to investigate it" (p. 126). "In New Zealand we saw fairly often a species . . . and we described it because it had not been examined by anyone before us. This we called *minor*, because the other species exceeded it in size. Before we could examine this species, the other ship²⁵ was separated from ours during a period of fog, and had been driven to the southern extremity of New Holland. In this corner of New Holland another species of *Aptenodytes*, which, on account of its remarkable crest, I have called *chrysocome*, had been killed by the seamen. An example of this species, given to me by the celebrated Captain Tobias Furneaux, I myself have described, while my son has made a plate of it. I afterwards saw in London another specimen, brought from the Falkland Islands, which Joh. Steph. Hausman, M.D., has now placed in the Museum of His Serene Highness, the Duke of Brunswick.

"At the New Year Islands, near Staaten Island, we saw several thousands of *Aptenodytes magellanicus*, and more than five hundred of them were eaten by the seamen. We met this same species at the Island of South Georgia, in Possession Harbour, together with another gigantic species, which we accordingly named *patuchonica*.

"Before we landed, we saw from the ship in the neighbourhood of this Island, Penguins with intensely reddish eyes, swimming in the sea. We had come across the same kind of bird in the sea which washes the Island seen by the French Captain, Kerguelen, in the neighbourhood of which we cruised, the air being obscured for some days by a very dense

²³ Forster—*Historia Aptenodytes*, etc., 1781, p. 125.

²⁴ I acknowledge my indebtedness to Assistant-Professor F. A. Todd, of the Sydney University, for elucidation of some obscure passages in the Latin text.

²⁵ The *Adventure*, Captain Furneaux.

fog; and the celebrated Sonnerat²⁶ captured the same species almost on the Equator. Other navigators had seen the same birds too, at the Falkland Islands, and we called this Penguin *torquata*, because of its white collar.

P. 128 "We saw another species brought from the Falkland Islands . . . *A. papua*."

P. 129 "The *Aptenodytes*, *chrysocome*, *magellanica*, *antarctica*, and *minor*, were seen by us to fling themselves out of the water with a leap and with a sort of shooting motion; and on the same spot to dive in again, first with the head, and then with the whole body."

The first species to be described in detail is the Crested Penguin. I translate the following:—p. 135. "*Aptenodytes chrysocome*, with dark red bill, yellowish feet; frontal crest, narrow and erect, auricular crest, sulphur coloured and drooping (Pl. x., fig. 1).

"*Pingouin sauteur*, Bougainville Voyage, p. 69 (French edition), pp. 64-5 (English edition).

"*Habitat*: The southern part of New Holland, called Van Diemen's Landt, and the Falkland Islands.

²⁶ M. Sonnerat (5) published his "Voyage a la Nouvelle Guinée" in 1776. Chapter xii. of this work is entitled "Description de quelques Oiseaux de la Nouvelle Guinée." From this chapter, which is copiously illustrated, I translate the following:—"It remains only for me to speak of three birds, all three of the 'Manchot' (Penguin) family. This family comprises only sea-birds, the species it contains are all devoid of the power to fly, they walk awkwardly, and in walking carry the head erect and perpendicular; their feet are right behind, and so short that the bird can only take very short steps. The wings are only appendages attached to the place where true wings ought to belong; their use seems only to be to assist the staggering bird, and to serve it as a balancing pole, in its erratic course. The sea is the element of the Penguins. Travellers often confuse them with the 'pingoins'; they differ from the latter, however, in two very perceptible characters, in the shape of the wings, which although very short and very narrow in the 'pingoins,' nevertheless, allow them to rise and to fly some distance; in the shape of the bill, which in the 'pingoins' is large and flattened at the sides, and in the 'Manchots' is thin, rounded and cylindrical. The 'Manchots' inhabit desert islands in the Indian and American oceans, they come to land to pass the night, and to lay their eggs. The inability of these birds to fly, the difficulty they experience in running, place them at the mercy of those who chance to land on the islands which serve them for shelter. They are captured running; knocked on the head with a stick or stone, and owing to their form, which puts it out of their power to avoid an enemy, they are regarded as being stupid, and no trouble is taken to look after their preservation. They are not found in inhabited places, and have never been there. They belong to a race which, unable to defend themselves or to escape, will surely disappear, above all, where man the destroyer settles, who allows nothing to survive which he can annihilate. I will mention the three Manchots which I have observed, one the Manchot of New Guinea, another, the Collared Manchot of New Guinea, and the third, the Manchot Papua."

Sonnerat's plates show that the first is the King Penguin (*Aptenodytes patagonica*), the second, the Collared (Forster's *torquata*) and the third, the Gentoo Penguin (*Pygoscelis papua*). Obviously Sonnerat had specimens of the birds to describe and to delineate, but equally obviously he was in error in including them in the avifauna of New Guinea. Forster blindly followed him and gave New Guinea as a habitat (inter alia) of his *Aptenodytes patagonica*, *A. torquata*, and *A. papua*. This error appears also to have been responsible for Ramsay's Gulf of Carpentaria, and Campbell's Northern Territory ranges for *E. chrysocome*."

"Captain Tobias Furneaux, having become separated from our ship about the month of March, 1773, reached the southernmost corner of New Holland, and in a harbour called Adventure Bay found this Penguin sitting on a rock. One of the sailors disabled it with one blow of a stick, and captured it. He then took it alive to the ship, in which it lived for some days. When it died the skin was stuffed by order of the Captain, and entrusted to me to describe; my son also made a drawing of it. My distinguished young friend, Joh. Stephan Hausman, M.D., lately a member of the University of Göttingen,²⁷ had bought another example of the same species in London, and had resolved to place it in the Museum of His Serene Highness, the Duke of Brunswick.²⁸ I ordered this to be again examined and drawn, giving the commission to Jo. Fred Miller, the talented painter and copper plate engraver. These Penguins lay their eggs among the nests of the Cormorants.²⁹ When angry they erect their crests. While swimming they jump out of the water in leaps and then dive again." The detailed description of the species follows.

In a note Forster says:—"In the figure of this and of the rest of the Penguins, I find the artist wanting in accuracy, especially in regard to the feet; and I draw attention to this lest others be led astray through fault of mine."

In 1844 Lichtenstein³⁰ published a volume containing descriptions of the animals collected and observed by Forster during the voyage to the southern seas, compiled from Forster's own annotated papers. The reference to the Crested Penguin is found on page 348 as follows:—

"The other Captain had first found the Crested Penguin in the southern part of New Holland, and had brought its dried skin with him. I made my drawing and description from this and called the bird *Aptenodytes chrysocome*. Its specific character will, therefore, be properly expressed thus:—'A. With twin auricular crests drooping and sulphur coloured.' Bougainville describes another Crested Penguin living in colonies at the Falkland Islands. It is smaller than the *patagonica*, progresses by leaps, is active, of a rich yellow, with a golden crest which it erects when annoyed, and with yellow eyelids. Perhaps this is identical with our *chrysocome*, or may even be a distinct species; but the obscure description of the distinguishing voyager does not make this clear."

From the foregoing extracts, one fact stands out incontrovertibly, viz.: that Forster's *Aptenodytes chrysocome* is a composite, founded on a dried skin taken in Tasmania, and another, bought in London, said to have been brought from the Falkland Islands.

In describing his movements from the time he became separated in the "Adventure" from Captain Cook in the "Resolution," Furneaux³¹ recounts his arrival at Van Diemen's Land, and sojourn in "Adventure

²⁷ "Civis nuper Georgiæ Augustæ." Georgia Augusta is the University of Göttingen, commonly known by that name to this day. Civis=civis academicus.

²⁸ Göttingen is in the Duchy of Brunswick.

²⁹ "Inter Pelecanorum nidos ova deponunt." The Cormorant, referred to is *P. carunculatus*, a Falkland Island species.

³⁰ Lichtenstein—Descriptiones animalium, etc., 1844.

³¹ Cook—A Voyage towards the South Pole, and Round the World, etc., 1779, i., p. 112.

Bay." He details the natural features, signs of natives, trees, plants and animals, and proceeds:—"The land birds we saw, are a bird like the raven; some of the crow kind, black, with the tips of the feathers of the tail and wings white, their bill long and very sharp; some parrots; and several kinds of small birds. The sea-fowl are ducks, teal and the sheldrake. I forgot to mention a large white bird, that one of the gentlemen shot, about the size of a large kite of the eagle kind." No mention is made of the capture of the Crested Penguin. In his "Voyage"²² also, Forster does not mention receiving the skin from Furneaux, although he relates in detail the separation of the two ships (Forster was on the *Resolution*), the reunion in Queen Charlotte Sound, and Furneaux' account of his doings in the interim.

Conclusions.

1.—The type of *Endyptes chrysocome*, Forster, in relation to Australia was described from the dried skin of a bird captured in 1773, in Adventure Bay, Tasmania, where the species was, even at that time, of rare occurrence.

2.—The true habitat of the species is limited to the subantarctic islands—Kerguelen, Macquarie, Antipodes, Snares, and Campbell Islands, where it breeds in colonies.

3.—Between breeding seasons it ranges over the seas washing the southern coasts of Australia and New Zealand.

4.—Individuals occasionally land on the Tasmanian and Australian coasts, but they never breed, and have never bred on these coasts.

5.—The range of the species is gradually extending northward, but whether this is part of a general northward migration of Antarctic species, there is not sufficient evidence available to show. It may be pointed out in this connection that the Little Penguin (*Eudyptula minor*, Forster) has, within the last twenty years, extended its breeding range from Montague Island, one hundred and fifty miles south of Port Jackson, to Port Stephens, ninety miles north of that harbour.

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²² Forster (G.)—A Voyage round the World in His Britannic Majesty's Sloop *Resolution*, etc., 1778.

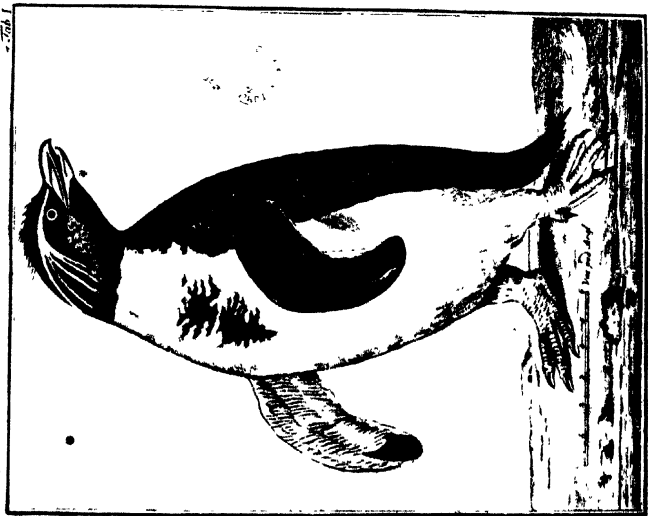
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EXPLANATION OF PLATE X.

- Fig. 1. *Aptenodytes chrysocome*, Forster, reproduced by permission of the Trustees of the Mitchell Library, Sydney, from Forster's "*Historia Aptenodytæ*," 1781.
- 2-3. *Eudyptes chrysocome*, Forster, captured at Ettalong Beach, Broken Bay, New South Wales, in December, 1917.



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ADENYDONTES hyacinthinus

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Photos by (1) MERCER and RAMSAY.
(2) C. CLUTTON, Austr. Mus.

EXPLANATION OF PLATE XI.

- Fig. 1. *Eudyptes chrysocome*, Forster, captured at Lorne, Victoria, in February, 1910.
2. *Eudyptes chrysocome*, Forster, found dead on beach near Devonport, Tasmania, in September, 1913.



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Photos by (1) W. A. POTTER.
(2) H. STUART DOVE.

AUSTRALIAN TRAP-DOOR SPIDERS

BY

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AND

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Plates xii.-xxiv.

INTRODUCTION.

This paper deals with a large amount of material chiefly personally collected by one of the authors [R.H.P.] between 1907-1917 in all the Continental States, except Victoria.

The collections in South Australia have been much assisted by teachers of the State schools, who in many cases, turned the nature study interests of their scholars towards the study of spiders. This was stimulated by the contribution of a series of illustrated papers on Araneidæ to *The Children's Hour*. One of the most able and indefatigable collectors was Mr. T. Nevin, at that time at Mallala, thirty miles north of Adelaide. The references to localities in this paper will shew how thoroughly the district was worked, and a great quantity of material of all kinds of spiders sent in for study.

The Queensland collections have been largely augmented by Dr. T. Bancroft, of Eidsvold, who lives in a district at the head of the Burnett River watershed, which is evidently surpassingly rich in Territellaridæ. To his efforts we owe the discovery of the new group Dolichosterneæ and many new genera and species.

SOUTH AUSTRALIA.

The first collections made, were by one of the writers [R.H.P.] on the Adelaide Plains and the Mount Lofty Ranges. On the Adelaide Plains, with an average rainfall of a little over twenty inches, the summer heat conditions are at times very severe.

The common trapdoor spiders are *Blakistonia aurea*, Hogg, and *Aganippe subaristis*, Camb.

The *Blakistonia* is to be found nearly everywhere in parks and gardens, paddocks, and the unploughed ground along the highways leading from the city. In many places between Adelaide and the sea, the nests of this species occur in great numbers, not infrequently there being several to the square yard (Pl. xiii, fig. 8). The *Blakistonia* must be regarded as having considerable economic value in reducing grasshoppers and other pests. As is usual with the Territellaridæ the inhabitants of the burrows are always females and the males are chiefly found in the cold, wet weather, hiding under stones. The young seem to stay with the mother for a good time after leaving the pillow-shaped egg sac, which is suspended half way down the tube. Egg sacs were found in April and in the winter (June and July), the young frequently occupy the tube, leaving it in the spring to colonise in the vicinity of the parent burrow. It is to be noted that the first infantile burrows are not provided with lids; after about the

third moult the lid is put on and the increase in the size of the burrow is kept up by cleaning out and adding to the lid until the maximum is reached. When the lid is broken off a fresh one is soon built from the hinge inwards. In the wet weather in moist situations the burrow is often half full of water. This does not seem to incommode the spiders as they have even been found below the water level.

The presence of enemies, especially the larger predatory wasps, makes it necessary for the spider to seal its burrow by spinning round the edge of the lid on the inside surface. Occasionally one finds the bottle-shaped pupa cases of the wasps in the burrow with the fragments of the spider exoskeleton.

Aganippe subtristis, Camb. (Pl. xii., fig. 3, and Pl. xxi., fig. 32), is far less abundant; it has a rounder lid, and is less easy to find than the foregoing. It is very variable in size, and occasionally one finds a giantess of such proportions that it is hard to recognise as the ordinary form. The habits of this species closely agree with those of the *Blakistonia*. Although occasional specimens of other species may be found on the plains they are chiefly met with as we ascend the foothills of the Mount Lofty Ranges. Thus on Black Hill we find *Aganippe modesta*, sp. nov. (Pl. xiii., figs. 4 and 5 and Pl. xxi., figs. 47 and 48), and the peculiar *Lampropodus scintillans*, gen. et sp. nov., of the group *Diplotheleæ*.

The males of the latter species had been long known to us from the sea coast and Mallala, but it was not until 1917 that we found the female, and established the fact that a member of the *Barychelinae* can build a nest and lid like those of the *Ctenizæ* (Pl. xvii., figs. 17-20 and Pl. xviii., figs. 21 and 22), on this occasion two specimens were found.

The higher altitudes of the Mount Lofty Ranges, where the rainfall varies from forty to, in places, fifty inches and over, has proved to be very rich in general species, and certainly it has been well worked. *Blakistonia urea*, Hogg, is still found there, and often shews a peculiar modification of the lid, which is furnished with accurately interlocking dentations. *Missulena rubrocapitata*, Aussr. and *M. occatoria*, Walck., occur frequently, the highly coloured males of the former being most often sent in.

In June, 1908, a female of the latter was discovered in the lining tube intact, and this was found to have a door of the wafer type without any admixture of earth. Subsequently, two more *Missulena* burrows were found with wafer doors, in 1910, at Terowie.

The roadside cuttings around Mount Lofty and Aldgate, and thence to Mylor, have been most thoroughly searched and have yielded a number of species of *Aganippe*, *Dyarcycops*, *Armadalia*, *Aname* and *Chenistonia*. One of the commonest is *Aname nebulosa*, sp. nov., which is found practically everywhere and which builds the most ingenious nest yet found amongst the Australian *Territellariæ*. Other species of *Aname* such as *A. birói*, Kulcz., *A. grandis*, sp. nov. and *A. hirsuta*, sp. nov., are content with a burrow closed with a hymen, with a small central aperture to squeeze through.

The nest of *A. nebulosa* (Pl. xx., figs. 26, 27, 28), if in an exposed place, has a collar of leaves or grass to turn off the rain. As a rule the

burrow is seven inches deep, and at four inches from the top the closing mechanism is fixed. This is formed by a cuff of web, free at the top, fixed below, and weighted on one side by a flat-sided or hemispherical pill of earth, which, when the burrow is open, is fitted into a hollow in its side. When, however, the cuff is pulled down from below, the pill falls over and forms an effectual door to the lower part of the tube. This is more effectual as a protection than the surface lid, which is not wholly secure against predatory wasps. It is singular that we find the occurrence of the Territellariæ found in the Mount Lofty Ranges much influenced by the geological and forest conditions. The gritty clay of the stringy bark country (*Eucalyptus capitellata*) being in our experience much richer than the open forest country with its sparse undergrowth. The agricultural areas or grass plains to the north of Adelaide, extending about one hundred and fifty miles, have not been exhaustively studied, but many species are recorded from Booboorowie (near Burra), Yarcowie, Canowie and Mallala; the last named place, perhaps, giving the best idea of the denizens of the open Mallee scrubs.

In the winter of 1910, one of us [R.H.P.] spent several days at Pichi Richi Pass, a gorge in the Flinders Ranges, between Quorn and Port Augusta. This was found to yield a good number of species, including the largest South Australian Territellarian, *Selenocosmia stirlingi*, Hogg. This species lives in deep burrows and spins a hymen like the *Anames*. The large *Aname grandis* is also found there. This constructs a burrow identical with that of *Selenocosmia*, with a hymen.

Blakistoniu aurea, Hogg, also extends its limits northward to the Flinders Ranges, where it is found in company with *Aganippe subtristis*, on the banks of the Pichi Richi Creek at Wool Shed Flat. In 1910, this gorge was an excellent hunting ground for all sorts of Araneids, but it was noticed in passing through on January 1st, 1918, that the foothills and gullies, formerly visited [R.H.P.] were covered with wheat fields and nearly all the mallee scrub removed.

The Pichi Richi Pass opens out on the plain at the head of Spencer's Gulf, near Port Augusta. The country round the head of the Gulf was visited in the same expedition. This country is largely sand, with samphire flats, covered with *Kochia*, *Salsola*, blue bush and salt bush. Besides Territellariæ there are several species of lid-building *Lycosas*, some of which build a firm collar to hold the lid, and having a primitive hinge. Species that do not build lids in this country would be exposed constantly to the danger of having their burrows filled with the drift from sand storms.

The best field found in the vicinity of Port Augusta was a samphire flat to the east of the town. There were found *Aganippe robusta*, sp. nov., *Anidiops manstridgei*, Pocock and *Gaius hirsutus*, sp. nov. The latter, which is rare, sometimes reaches a large size and a giant specimen, undoubtedly of considerable age, had a burrow about twelve inches in depth, over a quarter of which was packed the debris of food, chiefly parts of Coleoptera.

The burrows and lids of this species, as of that of *Anidiops*, do not show great variation from the Ctenizid type, i.e., a thick lid of alternate layers of earth and web, like a gun wad, with a well constructed hinge.

The part of South Australia south of the Murray has not so far been well explored, and will probably yield new species. The same is true of Yorke's Peninsula and Eyre's Peninsula, of which our knowledge is limited to very few species.

WESTERN AUSTRALIA.

May, 1912.—After examining the country in the vicinity of Perth, some excursions were made into the Darling Ranges and down the South Coast as far as Pinjarra. King's Park proved to be the best collecting ground near Perth, and *Aganippe raphiduca*, sp. nov., was found on the sandy cliffs overlooking the Swan River and in the banks of the foot paths which go along the river face of the cliffs. This species builds a well-formed lid of the usual Aganippid type, and the excavation was of the ordinary form and length. A prolonged search in this locality failed to disclose any further forms.

At Kalamunda, in the Darling Ranges, *Albaniana flavomaculata*, sp. nov., was found under grass trees, the nests being of Ctenizid type. *Aname fuscocincta*, sp. nov., was also collected here. At the Mundaring Weir, were noticed the abodes of Territellariæ, but time did not allow of their investigation.

At Armadale, on the Southern Coast, road conditions proved favourable, and on the sheltered banks of a small creek *Albaniana inornata*, sp. nov., and *A. flavomaculata*, sp. nov., were discovered. These built beautifully formed, though fragile, lids with ridges sharply cut, suggesting the impression of a *Chione*, or other bivalve shell. *Armadalia setosa*, sp. nov., *Chenistonia auropilosa*, sp. nov., and *Ixamatus maculatus*, sp. nov., were also found in this favoured locality. A search was made further along the road, and near Jarrahdale, *Aname maculata*, sp. nov., was found in the steep banks of one of the creeks coming down from the Darling Ranges. There are many of these creeks, and it is certain that new discoveries await anyone who will carefully examine their banks.

In the West Australian Museum at Perth, there is the large lid of a Ctenizid from Pinjarra. This spot was visited but the species that makes the type of lid referred to was not found, although, a little later, we obtained a nest from the local school master.

December, 1917.—The country round the upper and lower Blackwood River in South Western Australia :—The most interesting discovery was *Aganippe latior*, O. P. Cambridge, described many years ago. This species is not uncommon on the road banks following the course of the Blackwood River to Nannup. It was found in company with *Arbanitis festinus*, sp. nov., and *Aname intricata*, sp. nov. The *A. latior* was busy rearing its brood, and its egg bags were suspended from the roof of the horizontal burrows in such a way that the spider could get in and out without disturbing them. The burrow of *Arbanitis festinus* was closed by a lid which did not differ greatly from that of *Aganippe latior*, but the egg bag was of a different form, being suspended by eight or ten threads like a hammock from the sloping roof of the burrow. The Karri country, between Nannup and the coast, failed to disclose any Ctenizæ, and the only species obtained was *Chenistonia villosa* at Carlotta Brook. This interesting spider was found under logs, one with the young in the egg bag just preparing to emerge.

NEW SOUTH WALES.

August, 1910, Sydney and Blue Mountains.—This excursion yielded in the immediate vicinity of Sydney, *Arbanitis gracilis*, sp. nov., a beautiful species building a thin sandy lid. It was found in the Domain under overhanging rocks near Mrs. Macquarie's Chair, and afterwards at various places, including Balmoral and Manly, and seems to be widely distributed round the harbour. In the gully at the back of Clifton Gardens, *Dyarcyops melancholicus*, sp. nov., was discovered, and there it is not uncommon. In one large burrow, a male and female were captured, which is quite unusual in our experience. A new *Anane*, *A. decora*, was collected at the same place, and there are probably other species awaiting the collector in the sheltered rock ledges here and in Middle Harbour.

A visit to Jenolan Caves in the same month, yielded *Arbanitis montanus*, sp. nov., found along the creek outside the Grand Arch; and on the return between Mount Victoria and Katoomba, *Dyarcyops biroi*, Kulcz., was found in abundance. This species was collected by Biró, of the Hungarian National Museum, in 1900, on his way back from New Britain and Huon Gulf, where he had collected a large number of Araneids and several Aviculariidae.¹

January, 1911, South Coast of New South Wales.—The first place visited was Stanwell Park, a subtropical rain forest in the Illawarra district, where *Stanwellia decora*, sp. nov., was observed and collected. Its simple unclosed burrows are common on the bank forming the upper side of what is now the old road. Here the ground is moist and soft, overgrown with dwarf ferns and mosses, and shaded from the sun most of the day. This was the only species found in the coal area, Ctenizæ evidently being absent. The next Territellarian met with on this walking tour was at Termeil Mountain, south of Ulladulla. This was *Atrax versuta*, Rainb. (Pl. xviii., fig. 30), of which several specimens were collected; all had the same peculiarity of nidification. On the sides of the road where roots had been exposed, the wood had decayed, leaving a tube of bark. This the *Atrax* had lined several inches (in one case, thirteen inches) back, and at the mouth of the burrow the web was expanded. One specimen was very large, and fought vigorously after being ejected from its burrow. It became much reduced and shrivelled to one of ordinary size after a few days in spirits.

No further Territellariæ were met with until Kiangra Valley, near Narooma, was reached. Here, in the midst of hills, clothed with open forest, a creek runs to the sea and a subtropical rain forest follows the water course. The ground is moist and everything grows with the utmost luxuriance, reminding one of a forest creek in the tropical rain forests of the Wide Bay district. In this favoured area, three species were found—*Dyarcyops biroi*, Kulcz. (Pl. xiv., fig. 9), *Chenistonia hoggi*, Rainb., and *Arbanitis elegans*, sp. nov. All were in simple burrows without any inward or outward attempt at protection. The tour was continued to Dromedary Mountain, thence to Bega and Eden, without any further

¹ Kulczyński, Ann. Mus. Nat. Hung., vi., 1908, p. 428.

species being observed. The subtropical scrub comes in again at the back of Eden, and a careful examination of this area is sure to disclose further species.

QUEENSLAND.

October, 1912, Kedron Brook.—Specimens had already been received from this source from Dr. Bancroft, but one of the writers [R.H.P.] was anxious to visit this promising locality, which is fast being spoilt by settlement. At the time of this visit, which was made from Eagle Junction, there was still some of the original scrub and some giant trees on the river banks. *Tambouriniana variabilis*, sp. nov., var. *flavomaculata*, was common, and two species of *Arbanitis*, *A. similaris*, sp. nov., and *A. hirsutus*, sp. nov., occurred less frequently—all three species being mingled, and all within reach of flood waters.

October, 1912.—The basaltic tableland of Tambourine Mountain is a typical vine scrub with a dense forest association of palms, Eucalypts and Indo-Malayan trees, e.g., *Flindersia*, *Castaneospermum*, *Drepanandra*, *Cedrela*, etc. The trees are of enormous height, closely packed together, with long, straight, bare trunks, often branchless, except at the crown, and some forms, nettles, bean trees, and figs, are buttressed up to ten and twelve feet from the ground. The crowns of the *Araucaria cunninghami* are laden with epiphytic ferns, which ultimately, by their accumulated weight, break the branches and fall to the ground, where they form a suitable nidus for some Territellariæ. Epiphytic orchids and ferns also occupy the trunks, but these were searched in vain for any arboreal form of trap-door spider.

One of the chief characteristics of the forest is the enormous number of vines, Bignonias, etc., which are seen going up out of sight to reach the sun on the tree tops. There is very little grass or other undergrowth in the denser parts of the forest. On such a high, undisturbed island plateau, we expected to find a rich hunting ground for Araneidæ, and indeed for Araneidæ as a whole, it is so, being especially rich in Attidæ.

The first Territellarian, which presented itself was *Atrax valida*, sp. nov. (Pl. xviii., fig. 29), a near relative of *A. veranta*, Rainb. This builds a white funnel of web around the opening of the burrow; it is abundant, and a large fallen epiphytic fern mass will often contain several nests. They are common at the old mill, and on digging one out it was found consuming a small frog (*Hyla*), of which, only the two hind legs were left; whether this is a common habit of the species we cannot say. Like others of the genus *Atrax*, this species is of a vicious disposition, and puts up a strong fight before it can be induced to enter a collecting tube.

Out in the open, chiefly at the base of *Macrozamia dennisoni*, which here reaches a great size, are found the dwellings of the beautiful *Arbanitis pulchra*, sp. nov. Their peculiarity is the large circular collar of web lying on the ground, spun very close and apparently intended to prevent the dry earth falling into the burrow, rather than for the purpose of a snare. This species avoids the dense forest. Another species, *Arbanitis papilionis*, sp. nov., does not shew any peculiarity in its dwelling.

At the top of the St. Bernard Falls, looking towards the sea, was found a colony of the large form of *Tambouriniana variabilis*, sp. nov.

These splendid spiders were in a secluded spot which had seldom been visited before. They were living in burrows of the true Ctenizid type, with large thick lids. This form was not found anywhere else on the mountain, and only five specimens in the colony, all of large size, so they are evidently not very prolific. *Anane villosa*, sp. nov., and *Albaniana villosa*, sp. nov., were also collected on this occasion, and these species probably complete the census of the Territellariæ of this particular area.

With the exception of two species, *Dyarcygops ionthus*, from Burwood, near Sydney, and *Anane butleri*, from Merri Creek, Victoria, the whole of the material described below was from Dr. Pulleine's collection. The authors wish the reader to note that measurements do not include the palces.

FAMILY AVICULARIDÆ.

Sub-family ACTINOPODINÆ.

Genus Missulena, *Walek*.

(=*Eriodon*, *Latr.*, *nom. nud.*)

MISSULENA INSIGNE, *O. P. Cambr.*

Eriodon insigne, *O. P. Cambr.*, *Ann. Mag. Nat. Hist.* (4), xix, 1877, p. 29; *Hogg*, *Proc. Zool. Soc.*, 1901, p. 223, figs. 21, *a, b*.

Hab.—Keith, South Australia. Widely distributed. Recorded from Brisbane, Queensland; Dimboola, Victoria; and Swan River, Western Australia.

MISSULENA RUBROCAPITATA, *Auss.*

Eriodon rubrocapitatum, *Auss.*, *Verh. Zool. bot. Ges. Wien*, xxv., 1875, p. 140, pl. v., figs. 1-4.

Eriodon semicoccinium, *Sim.* in *Semon*, *Zool. Forsch. Austr. Malay Archipel.*, 1896, Lief. 8, p. 343.

Actinopus formosus, *Rainb.*, *Proc. Linn. Soc. N.S. Wales*, xxi., 1896, p. 328, pl. xx.; *op. cit.*, xxii., 1897, p. 253.

Eriodon rubrocapitatum, *Hogg*, *Proc. Zool. Soc.*, 1901, p. 226, fig. 23a.

Eriodon semicoccinium, *Hogg*, *loc. cit.*, p. 228.

Eriodon rubrocapitatum, *Rainb.*, *Rec. Austr. Mus*, v., 1, 1903, p. 64, fig. 6.

Obs.—*M. rubrocapitata* and *M. insigne* are very closely allied. They differ, however, in their eye formulae. See *Hogg's* note and figures (*supra*) on this point.

Hab.—Prospect Hill, up meadows; also Ambleside (formerly Hahndorf), South Australia, October, 1908. Distributed over Northern, Eastern and Western Australia.

MISSULENA REFLEXA, *sp. nov.*

(Plate xxi., figs. 33 and 34).

♂ Cephalothorax, 4.3 mm. long, 5 mm. broad; abdomen, 5.7 mm. long, 5.7 mm. broad.

Cephalothorax.—Longer than broad, pubescent. *Pars cephalica* bright red, truncate in front, raised high, strongly arched, sides and posterior

extremity declivous, segmental groove distinct; a narrow, but well defined grey mark or line runs down the middle; this latter commences between, and just in front of, the front median eyes, at the rear of which it is interrupted; *ocular area* broader than long; *clypeus* slightly undulated, not deep, precipitate. *Pars thoracica* broad, dark brown, channelled down the middle, reflexed, and retreating laterally towards posterior angle, radial grooves present but indistinct; *thoracic fovea* deep, recurved; *marginal band* narrow, red. *Eyes*.—Small, nearly equal in size, distributed over two rows of four each, and with the exception of the front median pair (which are only removed from each other by a space equal to once their individual diameter), widely separated; lateral eyes elliptical, oblique, inner angles raised, dark brown (Pl. xxi. fig. 33). *Legs*.—Long, olivaceous brown, shining, hairy, well armed with long spines, *coxa* olivaceous green; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, concolorous with legs, hairy; tibial joint, small; genital bulb, shining, reddish; style moderately long, sharply pointed (Pl. xxi. fig. 34). *Fulces*.—Concolorous, with cephalic segment well arched, moderately clothed with rather long black hairs; *rastellum* consists of a single transverse row of strong teeth; inner angle of the furrow of each falx armed with a row of seven teeth, of which the third and fifth from the fang are much the longest; outer angle armed with only one tooth; *fang* long, reddish, well curved. *Maxilla*.—Orange-yellow, shining, arched, moderately hairy, heel well rounded at base, upper angle acuminate at apex. *Labium*.—Coniform, elongate, rather darker than maxillæ, moderately hairy, apex fringed with rather long black hairs. *Sternum*.—Longer than broad, arched, anterior angle rather deeply excavated, lateral and posterior angles undulated, orange-yellow in front, thence smoky yellow, moderately clothed with rather long black hairs and a few long black bristles; sternal sigilla submarginal, anterior pair round, median and lateral pairs elliptical, the latter much the largest. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, moderately clothed with long, black hairs, superior surface dull cinnamon-yellow, with a large pale yellowish patch in front; sides cinnamon-yellow, hairy; inferior surface concolorous, thickly clothed with long, black hairs. *Spinnerets*.—Short, hairy, concolorous, apices yellow; inferior pair cylindrical, close together.

Obs.—Closely allied to, but easily distinguishable from *M. insignis* and *M. rubrocapitata* by eye formula, distinction of falces, and colour of abdomen.

Hab.—Keith, South Australia.

MISSULENA OCCATORIA, Walck.

(Plate xii., figs. 1 and 2).

Missulena occatoria, Walck., Tab. des Aran., 1805, p. 8, pl. 2, figs. 11-14; *Id.*, Ins. Apt., 1837, i., p. 252.

Eriedon occatoriuni, Lucas, Ann. Soc. Ent. France (4), v., 1865, p. 309, pl. 8; L. Koch; Die Arach. des Austr., i., 1873, p. 457; Hogg, Proc. Zool. Soc., 1901, p. 220; Rainb., Rec. Austr. Mus., v., 1, 1908, p. 63, fig. 5.

Missulena (Eriodon) occatoriu, Hogg, Proc. Zool. Soc., 1908, p. 335, figs. a, b.

Obs.—Living specimens kept for observation at the Australian Museum, failed to make lids for their subterranean retreats.—J.R.

Hub.—Brisbane, Queensland; Mount Lofty, South Australia. Ranges through Eastern, Southern and Western Australia.

MISSULENA FORMIDABILE, O. P. Cambr.

Eriodon formidabile, O. P. Cambr., Journ. Linn. Soc., Zool., x., 1868, p. 226; L. Koch, Die Arach. des Austr., 1873, i., p. 454; Hogg, Proc. Zool. Soc., 1901, p. 222; *Op. cit.*, ii., 1902, p. 121 (footnote).

Obs.—This we take to be O. P. Cambridge's species, as the eye formula agrees well with that author's description, and also that of Hogg's (*supra*).

Hab.—Mallala, South Australia.

Sub-family CTENIZINÆ.

Group CYRTAUCHENIÆ.

Genus *Cantuarina*, Hogg.

CANTUARIA HOGGI, Simon.

Cantuarina hoggi, Simon, Die Fauna Sud West Austr., i., 1908, p. 361.

Hab.—Avenue Range, South Australia, April, 1908.

Group AGANIPPEÆ.

Genus *Aganippe*, O. P. Cambr.

The genus *Aganippe* is typically Australian. Up to the date of the publication of this paper, seven species had been recorded to it. To this number seven more are now added, all of which are described hereunder. In addition to this, the male of *A. subtristis*, O. P. Cambr., is also described. The following table may assist the student in the elucidation of the species:—

- Front eyes of male about twice their individual diameter apart; stigma of palpal bulb broad, twisted, and terminating in a long fine style; cephalothorax, legs and abdomen setose; sternum terminating in an acute point between fourth pair of coxæ.....*A. pulleinsi*, Hogg.
- Front eyes of male about three times their individual diameter apart; stigma of palpal bulb very slightly twisted, the style long and blunt; cephalothorax and abdomen setose; posterior extremity of sternum less acute than in *A. pulleinsi*.
- Front eyes of female fully four times their individual diameter apart; abdominal muscle spots distinct.....*A. subtristis*, O. P. Cambr.
- Front eyes of male one and a half their individual diameter apart; cephalothorax, abdomen and legs strongly setose; stigma of palpal bulb broad, twisted, spatulate, and terminating with a short, fine style.
- Front eyes of female separated from each other by a space equal to rather more than once their individual diameter; abdomen densely matted with long hairs, and having in addition a number of long bristles or setæ; muscle spots large, distinct, yellow.....*A. raphiduca*, sp. nov.

- Front eyes of female fully twice their individual diameter apart; front and rear side eyes of nearly equal size; second or intermediate pair largest of the series, abdomen dark brown spotted with yellow.....*A. bancrofti*, sp. nov.
- Front eyes fully twice their diameter apart; abdomen dark brown, densely hairy.....*A. villosa*, sp. nov.
- Front eyes fully twice their individual diameter apart; legs short, stout; abdomen chocolate-brown, mottled with yellow; muscle spots yellow, prominent.....*A. robusta*, sp. nov.
- Front eyes two and a half times their individual diameter apart; abdomen ovate, black, marked with broad, recurved transverse bars.....*A. ornata*, sp. nov.
- Front eyes fully twice the individual diameter of one of their second or median neighbours apart; median eyes (second row) largest of the series; style of palpal bulb twisted and terminating in a long, fine point; muscle spots distinct, yellow.....*A. berlandi*, Rainb.
- Front eyes of male once their individual diameter apart; second or intermediate eyes largest of the group and about half their individual diameter apart; palpal stigma twisted, style rather short.....*A. smeatoni*, Hogg.
- Front eyes of female about twice their individual diameter apart; front and rear side eyes equal; second or intermediate eyes small, equal in size to those of the rear medians.....*A. latior*, O. P. Cambr.
- Front median eyes more than one and a half times the long diameter of the rear eyes, and at least once their own individual diameter apart; labium nearly twice as broad as long, hollowed in front.....*A. occidentalis*, Hogg.
- Front pair of eyes about once their own individual diameter apart; rear median eyes minute, each separated from its lateral neighbour by a space equal to that of three times its own individual diameter; labium broader than long.....*A. whitei*, Rainb.
- Front eyes rather more than once their individual diameter apart; thoracic fovea deep, procurved; posterior sigilla round, and away from margin; a few small spines on maxillæ; none visible on labium.....*A. modesta*, sp. nov.
- Front eyes just touching edge of clypeus, once and a half their own individual diameter apart; thoracic fovea deep, procurved; posterior sigilla large, and away from margin; small cluster of spines at base of maxillæ, none on lip.....*A. pelochroua*, sp. nov.

AGANIPPE (P)PULLEINEI, Hogg.

Arganippe pulleinei, Hogg, Proc. Zool. Soc., 1902, p. 128, figs. *a*, *b*, *c*.

Hab.—Mount Pleasant, April, 1908, also Tea-tree swamp, Grange, South Australia. Formerly recorded from Blakiston and Hallett's Cove, South Australia.

AGANIPPE SMEATONI, Hogg.

Arganippe smeatoni, Hogg, Proc. Zool. Soc., ii., 1902, p. 126, figs. *a*, *b*, *c*, pl. xiii., fig. 7; Simon, Hist. Nat. des Araign., ii., 1897 (1903), p. 903.

Obs.—An immature female example, which may probably prove to be the young of this species. At present the male only is known definitely.

Hab.—Booboorowie, South Australia. Originally recorded from Blakiston.

AGANIPPE SUBTRISTIS, O. P. Cambr.

(Pl. xxi., figs. 32, 35, 36, 37.)

Arganippe subtristis, O. P. Cambr., Ann. Mag. Nat. Hist. (4), xix., 1877, p. 28, pl. vi., fig. 3; Pocock, *Op. cit.*, (6), xix., 1897, p. 112; Hogg, Proc. Zool. Soc., 1901, p. 231; *Op. cit.*, 1902, p. 126, pl. xiii., fig. 6.

In 1877, as quoted above, the Rev. O. P. Cambridge described and figured the above species, erecting for its reception, at the same time, the genus of which it forms the type. The type specimen was a female example, and dry, and the description incomplete. In 1899 Pocock published additional details in elucidation of the species, and this was followed in 1901, and again in 1902, by Hogg with further additional remarks and a figure. Up to the present, however, the male has remained unknown in literature, but in Dr. Pulleine's collection there are examples from several localities. The description of the male is as follows:—

♂. Cephalothorax, 12 mm. long, 9.5 mm. broad; abdomen, 9 mm. long, 7.3 mm. broad.

Cephalothorax.—Yellow, obovate. *Pars cephalica* raised, arched, truncated in front, smooth, very sparingly clothed with short yellow down; a thin fringe of black setose bristles runs down the middle from rear of ocular area; segmental groove distinct; *ocular area* black, broader than long and furnished in front with a few black setæ; *clypeus* sloping forward, hyaline. *Pars thoracica* broad, moderately arched, sparingly clothed with yellow down, smooth, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* thickly fringed with black setæ. *Eyes*.—Arranged in three rows of 2, 2, 4. Anterior pair nearly three times their individual diameter apart, and raised on black rings; a space nearly equal to once their individual diameter separates them from their neighbours of the second row; second pair round, rather smaller than their anterior neighbours, and separated from each other by a space equal to about once their individual diameter; those of the rear row are smaller still but of equal size, and form a slightly recurved line; each inner eye is separated from its lateral neighbour by a space equal to nearly once their individual diameter; intermediate eyes of third row widely separated (Pl. xxi., fig. 32). *Legs*.—Yellow, long, tapering, moderately hairy, but thickly clothed with setæ, and armed with a few not very strong spines; tibia i. furnished on inner angle with an apophysis (Pl. xxi., fig. 35); leg iv. strongest; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, similar in colour, clothing and armature to legs; tibia, inflated and furnished with an apophysis (Pl. xxi., fig. 36); tibial joint small; bulb uneven, shining dark brown laterally and beneath; style long, twisted and terminating in a somewhat obtuse point (Pl. xxi., fig. 37). *Pulces*.—Moderately projected forward, concolourous with cephalothorax, sides and inner angles thickly clothed with stout bristles, and displaying naked patches; *fang* long, well curved, dark brown, shining. *Maxillæ*.—Long, yellow, arched, divergent, clothed with long hairs and coarse bristles or setæ, heel rounded. *Labium*.—Normal, concolourous, submerged beneath maxillæ. *Sternum*.—Concolourous with labium, pyriform, thickly studded with long, black setæ; posterior sigilla orange-coloured and removed from margin. *Abdomen*.—Obovate, yellow brown, slightly overhanging base of cephalothorax, arched; superior surface clothed with fine hairs and thickly studded with black setæ; sides and

inferior surface concolourous, hairy, but less densely setose; lung spots distinct. Spinnerets.—Normal.

Obs.—Specimens contained in the above series are in various stages of development from the half-grown to adult. The older examples are much the darkest. After *Blakistonia aurea*, Hogg, this is the most common Ctenizid of the plains, and is quite frequent in the gardens and roadsides around Adelaide. The nest is not quite so apparent as that of *Blakistonia*, and it is less frequently found. The lid is nearly orbicular and flat above and below only having a very shallow bevel into the tube which is well lined and frequently five to six inches deep, being quite vertical in soft ground. The breeding habits of this spider have not been observed, as the males are rare and seldom found in the tubes. The species has a very wide distribution in South Australia and rarely examples attain very large size, either from great age or specially favourable circumstances.

Hub.—Males: North Adelaide (July, 1908), Happy Valley (April, 1908), Yarcowie, Booboorowie (May, 1908), Mallala, and Tea Tree Gully (November, 1903), South Australia. Females: East of Spencer's Gulf, Canowie, Booboorie (April 25, 1908), Pichi Richi, Mallala, Yarcowie, Kalangadoo, foot of Black Hill, and Port Augusta, South Australia.

AGANIPPE LATIOR, O. P. Cambr.

Aganippe latior, O. P. Cambr., ANN. MAG. NAT. HIST. (4), xix., 1877, p. 29, Pl. vi., fig. 3.

Eucyrtops latior, Pocock, *op. cit.* (6), xix., 1897, p. 113; Hogg, Proc. Zool. Soc., 1901, p. 232.

Aganippe latior, O. P. Cambr., Hogg, Proc. Zool. Soc., 1902, p. 126, Pl. xiii., fig. 5.

Obs.—One female example collected by Dr. R. H. Pulleine. The specimen agrees very well with the descriptions given by the Rev. O. P. Cambridge, and Mr. R. I. Pocock, and Mr. R. H. Hogg's figure (*suprà*). Up to the present time only one example of this unique species has been recorded, and it, the type which is in the British Museum, was collected by Mr. George Clinton, at Perth, West Australia. In his original description Cambridge says:—"The abdomen is hairy and of a reddish-warm colour, but it was too shrunken to give any exact idea of its form." The following notes on the Blackwood River specimen may be of service:—

♀. Cephalothorax, 9.4 mm. long, 8.7 mm. broad; abdomen, 13.1 mm. long, 8.7 mm. broad.

Abdomen.—Obovate, yellow-brown, faintly spotted with yellow, slightly overhanging base of cephalothorax, two widely separated well defined muscle-spots near the middle; superior surface and sides densely hairy and having in addition a few bristles; inferior surface yellow, its dark hirsute clothing imparting to it a somewhat smoky yellow appearance. *Spinnerets.*—Yellow, clothed with dark hairs; superior spinners stout, slightly tapering, basal joint longer than the second and third combined, the third minute and dome-shaped; inferior pair very short, rather stout, and separated from each other by a space equal to once their own individual transverse diameter.

Hab.—Blackwood River, South West Australia, December, 1917.

AGANIPPE RHAPHIDUCA,² *sp. nov.*

(Pl. xxi., figs. 38-42).

♂. Cephalothorax, 7·2 mm. long, 6·3 mm. broad; abdomen, 7·2 mm. long, 4·5 mm. broad.

Cephalothorax.—Obovate, uneven, dark brown, sparingly clothed with short, fine downy hairs, and rather strongly so with short, black setæ. *Pars cephalica* raised, narrow and truncated in front, fringed laterally with short, stiff, black setæ, segmental groove distinct; *ocular area* raised, arched, rather longer than broad, nearly black; *clypeus* undulated, hyaline. *Pars thoracica* arched, broad, radial grooves distinct; *thoracic fovea* deep, straight; *marginal band* fringed with strong black setæ. *Eyes*.—Distributed over three rows of 2, 2, 4; those of the front row are about one and a half their individual diameter apart, and touch the edge of the clypeus; those of the second row are distinctly larger than their anterior neighbours, from which latter they are separated by a space equal to about three quarters that of their individual diameter; the posterior row is slightly recurved, and arranged in pairs; of these the inner eyes are smaller than their lateral neighbours, and do not touch them; the eyes of the second row, as already pointed out, are larger than those of the first, and the latter are, again larger than the two laterals of the third row; the inner eyes of the latter are situated very close to those of the second row (Pl. xxi., fig. 38). *Legs*.—Long, tapering, concolourous with cephalothorax, hairy, armed with moderately long spines, and thickly beset with black spine-like setæ; tibia i. furnished with an apophysis (Pl. xxi., fig. 39); metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3; fourth pair strongest. *Palpi*.—Concolourous with legs, and similar to them in colour and armature, short, robust; tibia furnished with an apophysis (Pl. xxi., fig. 40); tibial joint small; bulb red, rounded shining, uneven; stigma broad, twisted, spatulate, and terminating with a short, stiff, blunt style; interior of spatula yellow (Pl. xxi., fig. 41). *Falces*.—Concolourous with cephalothorax, short, not robust, moderately projected forward, arched, hairy; *fang*, reddish-brown, moderately long, well curved. *Maxillæ*.—Long, divergent, arched, heel well rounded at base, yellow, hairy, a few small spines on inner angle. *Labium*.—Concolourous, normal, not spined. *Sternum*.—Yellow, pyriform, very moderately arched, broadest between third pair of coxæ, clothed with yellow hairs and stiff black bristles; posterior sigilla largest, situated at a point between second and third coxæ, submarginal. *Abdomen*.—Ovate, slightly overhanging base of cephalothorax; superior surface dark brown (nearly black), well arched, hairy, thickly beset with spine-like setæ, and displaying near the middle two large and prominent, yellow lung spots; sides dark brown also, and similar to superior surface in clothing and armature; inferior surface yellow, and clothed with long dark hairs. *Spinnerets*.—Yellow, hairy, superior pair sturdy, first joint longest, the third shortest and dome shaped; inferior pair very small, and separated from each other by a space equal to about once their individual diameter.

² ῥαφιδούχος, needle-bearing; in allusion to the creature's armature

Obs.—At first sight very like *A. subtristis* in general appearance, but easily distinguished from that species by its much smaller size, eye formula, spatulate style of palpus, tibial apophysis of leg i. and the prominent abdominal lung marks.

♀. Cephalothorax, 9.5 mm. long, 6.3 mm. broad; abdomen, 10.3 mm. long, 6.3 mm. broad.

Cephalothorax.—Obovate, yellow, with yellow-brown markings, sparingly clothed with fine yellowish pubescence. *Pars cephalica* well arched; thoracic groove profound; *ocular area* longer than broad, raised and strongly arched, rather dark, and furnished with a few long, black bristles; *clypeus* hyaline, sloping well forward, indented at the middle. *Pars thoracica* arched, sinuous laterally, radial grooves strongly defined; *thoracic fovea* deep, slightly procurved; *marginal band* broad, pallid, fringed with fine, yellowish hairs. *Eyes*.—Distributed over three rows of 2, 2, 4. The front pair elliptical, poised obliquely on black rings, touching margin of clypeus, and separated from each other by a space equal to rather more than once their individual diameter; median pair round, slightly larger than their anterior neighbours, and separated from each other by a space scarcely equal to that of once their own individual diameter; this pair is also separated from their anterior neighbours by a space equal to that of once their own individual diameter, and again by nearly the same distance from the inner eyes of the posterior row; posterior row slightly procurved on its front line and recurved on the posterior line; lateral eyes of this row elliptical, seated obliquely, about same size as those of the front row, and mounted on black rings; inner eyes minute, ringed with black; each is separated from its lateral neighbour by a space equal to that of once its own diameter; the two pairs constituting the third row widely removed (Pl. xxi., fig. 42). *Legs*.—Moderately long, strong, yellow, densely clothed with long black hairs, bristles and setæ, but showing naked patches on their upper surface; each tibia, metatarsus and tarsus armed with long, strong spines underneath, those on legs i. and ii. being the longest; the underside of each leg clothed with long, dark hairs and bristles; metatarsi and tarsi i. and ii. scopulated; claws long, well curved, and serrated at base. *Palpi*.—Long strong, yellow, similar in clothing and armature to legs i. and ii. *Falces*.—Yellow, well projected forward, inner angles and sides densely hairy, upper surface smooth; apices densely hairy and furnished with a powerful *rustellum*; upper angle of the furrow of each falx armed with seven teeth, and the lower with five; *fang* long, well curved, reddish. *Maxillæ*.—Yellowish-red, arched, divergent, well rounded at base, thickly matted with long hair, and furnished with a few small spines near the base at the inner angle. *Labium*.—Normal, concolourous with cephalothorax, submerged beneath bases of maxillæ, hairy, not spined. *Sternum*.—Pyriform, yellow, arched, well clothed with dark hairs and bristles, anterior sigilla marginal, the posterior large, round, removed from margin, and seated at a point between second and third pair of coxæ. *Abdomen*.—Ovate, brown, spotted with yellow, overhanging base of cephalothorax; upper surface thickly matted with dark brown hairs and bristles, and marked with four lung spots, the posterior pair of which are seated about the middle, are much the largest, and the widest apart; beneath the latter there are two large elliptical, obliquely directed yellowish marks,

and beneath these again three slightly curved, interrupted transverse bars; sides yellowish-brown, spotted with yellow, and similar to superior surface in clothing; inferior surface yellow, thickly clothed with black hairs. *Spinnerets*.—Yellow, short, stout, hairy; superior pair have the first joint longer than the second, and the second longer than the third; the latter is domed; inferior pair very short and separated from each other by a space equal to once their individual diameter.

Obs.—Some of the female specimens are rather larger than that selected for the type, and some lighter in colour, but in each the lung spots are distinct and well defined. The species appears common around Perth.

Hab.—King's Park, Perth (May 21, 1912), Keith, Armadale, West Australia (May 26, 1912).

AGANIPPE BANCROFTI, *sp. nov.*

(Pl. xxi., fig. 43).

♀. Cephalothorax, 9.2 mm. long, 6.3 mm. broad; abdomen, 10.5 mm. long, 6.3 mm. broad.

Cephalothorax.—Obovate, yellow-brown, rather thickly clothed with fine, moderately long, pale yellowish hairs. *Pars cephalica* strongly arched, truncated in front, fringed with short black hairs, thoracic groove distinct; *ocular area* longer than broad, slightly raised and furnished with a tuft of bristles in front of, and between anterior pair of eyes; *clypeus* hyaline, deep, sloping forward, sinuous. *Pars thoracica* moderately broad, arched, radial grooves defined; *thoracic fovea* deep, slightly procurved; *marginal band* broad, pallid, fringed with short black hairs. *Eyes*.—Distributed over three rows of 2, 2, 4; anterior pair elliptical, seated obliquely, poised on black rings, and separated from each other by a space equal to twice their individual diameter; median pair largest of the series, round, separated from their anterior neighbours by a space equal to nearly once their own individual diameter, and from each other by about one half their individual diameter; posterior row procurved on its front line, and recurved on the rear; posterior side eyes elliptical, same size as those of the posterior row, seated obliquely, and poised on black rings; inner eyes small, removed from second row by a space equal to once their individual diameter, round, each touching black ring of its lateral neighbour (Pl. xxi., fig. 43). *Legs*.—Moderately long, strong, tapering, yellow, hairy, but displaying naked patches; each tibia, metatarsus and tarsus, armed on the underside with long, fine spines; metatarsi and tarsi i. and ii. scopulated; metatarsus iv. has four short, strong spines on the inner side; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour and clothing to legs; two or three long, weak spines on tibia; tarsus scopulated. *Falces*.—Dark brown, moderately strong, projected well forward, arched, hairy; *rastellum* composed of three transverse rows of not very strong teeth; outer ridge of the furrow of each falx unarmed with teeth, whilst the inner has a row of eight strong teeth; *fangs* long, well curved, nearly black. *Maxillae*.—Yellowish, hairy, arched, apices divergent, heel well rounded, bases thickly studded with small spines; inner angles fringed with a long, red beard. *Labium*.—Concolourous, short, broad, free, arched, submerged, devoid of spines, but furnished with a few bristles. *Sternum*.—Concolourous also,

broadest between third pair of coxae; sigilla marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, moderately hairy; superior surface and sides dark brown mottled with yellow; inferior surface yellow; hairy. *Spinnerets*.—Yellow, hairy; superior pair stout, first joint longest, the third shortest and domed; inferior pair minute, rather less than their individual diameter apart.

Hab.—Eidsvold, Queensland. Named in honour of the collector, Dr. T. Baneroff.

AGANIPPE VILLOSA, *sp. nov.*

(Pl. xxi., fig. 44.)

♀. Cephalothorax, 9.9 mm. long, 6.9 mm. broad; abdomen, 9.5 mm. long, 6.5 mm. broad.

Cephalothorax.—Obovate, mahogany brown, shining, moderately pilose. *Pars cephalica* high, well arched, truncated in front, segmental groove distinct, compressed laterally; a fringe of black bristles runs down the middle; there are also a few short black bristles at rear of ocular eminence; *ocular area* raised, dark brown, rather longer than broad, furnished with a few long, strong black bristles; *clypeus* not deep, undulating. *Pars thoracica* uneven, radial grooves distinct; *thoracic fovea* deep, slightly procurved; *marginal band* moderately broad, undulating. *Eyes*.—Distributed over three rows of 2, 2, 4. Front eyes close to margin of clypeus, somewhat elliptical, poised upon black rings, and separated from each other by a space equal to rather more than twice their individual diameter; second pair of eyes round, rather smaller than foregoing, separated from their anterior neighbours by a space equal to about twice their individual diameter, and from each other by nearly one diameter; rear lateral eyes elliptical, largest of the entire group, placed somewhat obliquely, and poised upon black rings; intermediate eyes rather smaller than those of the second row, elliptical, poised on black rings, near to, but not touching, their lateral neighbours; the posterior row procurved on its front line and recurved at the rear (Pl. xxi., fig. 44). *Legs*.—Concolourous with cephalothorax, densely clothed with long, coarse bristles, but displaying naked patches; underside of tibiae i. and ii. armed with several short, strong spines; metatarsus iii. armed on upper side with six short, strong, black spines arranged in pairs; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Rather long, strong, similar in colour and clothing to legs; patella, tibia and tarsus bespined; the latter scopulated. *Falces*.—Projected well forward, rather darker than cephalothorax, inner and outer angles and apices densely clothed with coarse hairs or bristles and displaying naked patches; *rastellum* consists of three transverse rows of strong teeth; inner angle of the furrow of each falx armed with six strong teeth, and the outer with nine smaller ones; in addition to these there is an intermediate row consisting of several small teeth. *Maxillae*.—Arched, shining, yellow-brown, hairy, heel well rounded at base, apex of inner angle obtusely pointed; there is a cluster of small spines at the basal angle just above apex of lip. *Labium*.—Normal, concolourous, shining, well arched, hairy, devoid of spines. *Sternum*.—Pyriform, concolourous also, shining, rather thickly clothed with long, black hairs or bristles;

sigilla marginal. *Abdomen.*—Obovate, slightly overhanging base of cephalothorax, arched, dark brown, densely hairy. *Spinnerets.*—Concolorous with abdomen, hairy; first joint of superior pair long, the third shortest and domed; inferior pair very small, and separated from each other by a space equal to once their individual diameter.

Obs.—A very distinct form. Unfortunately the specimen had been dried, consequently it was somewhat shrivelled, and as a result of drying some of the leg spines had fallen off.

Hab.—Bridgewater, South Australia (October, 1911).

AGANIPPE ROBUSTA, *sp. nov.*

(Pl. xxi., figs. 45 and 46.)

♀. Cephalothorax, 13.8 mm. long, 8.8 mm. broad; abdomen, 16.2 mm. long, 10 mm. broad.

Cephalothorax.—Obovate, yellow-brown, shining; pilose. *Pars cephalica* high, well arched, thoracic groove well defined; a row of moderately long, stiff bristles runs down the middle; *ocular area* broader than long, slightly raised and furnished with a few long bristles; *clypeus* hyaline, sloping forward, indented at the middle. *Pars thoracica* broad, moderately arched, retreating posteriorly, radial groove distinct; *thoracic forea* deep, procurved; *marginal band* pallid, fringed with fine yellow hairs. *Eyes.*—Distributed over three rows of 2, 2, 4. The two front eyes are near to the edge of the clypeus, elliptical, and separated from each other by a space equal to fully twice their individual diameter, and from those of the second row by rather more than one; the eyes of the second row are round, rather small, and separated from each other by a space equal to more than once their individual diameter; posterior row distinctly procurved on the front line and slightly recurved on the rear; lateral eyes of this row equal in size to the anterior eyes, elliptical, seated obliquely, and poised upon black rings; rear median eyes smallest of the group, and away from their lateral neighbours; they are also widely removed from each other (Pl. xxi., fig. 45). *Legs.*—Sturdy, not long, yellow-brown, clothed with long black bristles, but displaying naked patches; tibiae and metatarsi i. and ii. armed with long, moderately strong spines, and those of legs iii. and iv. with a few rather short ones; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi.*—Similar in colour, clothing and armature to legs i. and ii.; tarsus scopulated. *Falces.*—Concolorous with legs, shining, clothed with coarse bristles, but displaying naked patches; *rustellum* consists of three transverse rows of teeth; inner ridge of the furrow of each falx armed with eight strong teeth, and the outer with six; in addition to these there is at the base an intermediate row of four very small teeth. *Maxillae.*—Shining, yellow-brown, hairy, arched, heel well rounded, inner angle obtusely pointed at apex, no spines present. *Labium.*—Concolorous, normal, shining, arched, hairy, submerged. *Sternum.*—Pyriform, concolorous also, uneven, moderately arched, hairy, anterior and intermediate sigilla marginal; posterior pair large, submarginal. *Abdomen.*—Obovate, arched, hairy, slightly overhanging base of cephalothorax, chocolate-brown mottled with yellow; four lung spots

present, distinct and yellow; beneath the second pair there are two moderately large, faintly distinct elliptical yellow spots, and beneath these again three faintly discernable recurved, transverse yellow bars; inferior surface dull yellow, densely hairy (Pl. xxi., fig. 46). *Spinnerets*.—Yellow, hairy; first joint of superior pair longest, the third shortest and dome-shaped.

Obs.—The collection contains two specimens, one of which (probably gravid) is stouter than that selected for the type. The eye formula bears a strong superficial resemblance to Cambridge's *A. latior*, but it may be easily distinguished therefrom by the intermediate eyes of the rear row being decidedly closer to their lateral neighbours, and also distinctly smaller than those of the second row.

Hab.—Reed Beds, near Adelaide (August, 1911), and Port Augusta, South Australia.

AGANIPPE MODESTA, sp. nov

(Pl. xiii., figs. 4 and 5, and Pl. xxi., figs. 47 and 48.)

♀. Cephalothorax, 7.6 mm long, 5.7 mm. broad; abdomen, 10.5 mm. long, 7.7 mm. broad.

Cephalothorax.—Obovate, yellowish grey, moderately clothed with fine, pale downy hairs. *Pars cephalica* ascending, arched, pencilled down the middle where there is a row of short, stiff, black bristles, and also laterally at posterior extremity, segmental groove distinct; *ocular area* rather broader than long, raised, arched, smoky brown, and furnished in front with a tuft of short black bristles; *clypeus* hyaline, very broad, sloping well forward, deeply indented at middle. *Pars thoracica* arched, retreating rearwards, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* undulated, pallid, and fringed with a few rather long, fine hairs. *Eyes*.—Distributed over three rows of 2, 2, 4; anterior pair largest of the group, and separated from each other by a space equal to that of rather more than once their individual diameter; intermediate pair very small, round, and separated from each other by a space equal to once their own individual diameter; rear row procurved on its front line and recurved behind; lateral eyes elliptical, very slightly smaller than those of its front row, poised obliquely, and ringed with black; intermediate eyes minute, elliptical, widely removed, each one touching the outer ring of its lateral neighbour (Pl. xxi., fig. 47). *Legs*.—Concolorous with cephalothorax, rather short, strong, hairy but displaying naked areas, each ambulatory limb armed with a few not very strong black spines; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour, clothing and armature to legs; tarsus scopulated. *Fulces*.—Projected well forward, shining, yellow brown, each pencilled at upper inner angle and laterally with dark brown, clothed with fine dark brown hairs and long coarse bristles, but displaying extensive naked areas; inner angle of the furrow of each falx armed with five strong teeth; *rastellum* consists of a number of strong teeth distributed over an extensive area; *fang* dark brown, shining, well curved. *Maxillæ*.—Reddish-brown, arched, hairy, well rounded at heel; lower area of inner

~~capitulum~~ furnished with a few small spines; apex obtusely pointed. *Labium*.—~~Capitulum~~ darker than foregoing, broader than long, arched, hairy, no spines visible. *Sternum*.—Yellowish-gray, moderately arched, clothed with black bristles, pyriform, undulated laterally and terminating obtusely between fourth pair of coxæ; posterior sigilla round, and away from margin. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, well arched, moderately hairy; superior surface darkish yellow brown spotted with yellow; sides concolorous; inferior surface yellowish, hairy; when immersed in spirit a faint dorsal design is noticeable (Pl. xxi, fig. 48). *Spinnerets*.—Yellow, hairy; superior pair stout, first joint much the longest, the third shortest and dome-shaped; inferior spinners short, stout, apices rounded, and separated from each other by a space equal to once their individual transverse diameter.

Hab.—Black Hill, Mount Lofty, South Australia (November 18, 1917).

AGANIPPE ORNATA, *sp. nov.*

(Pl. xxi., figs. 49 and 50.)

♀. Cephalothorax, 5.6 mm. long, 4.3 mm. broad; abdomen, 7.6 mm. long, 4.7 mm. broad.

Cephalothorax.—Obovate, yellow-brown, shining, clothed with long, yellowish, silky hairs. *Pars cephalica* high, ascending, slightly compressed at sides, segmental groove well defined; *ocular area* elevated, arched, black; *clypeus* broad, deep, hyaline, sloping forward, undulating. *Pars thoracica* arched, uneven, retreating towards posterior angle, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* black, undulating. *Eyes*.—Distributed over three rows of 2, 2, 4; anterior pair largest and separated from each other by a space equal to two-and-a-half times their individual diameter, somewhat elliptical, seated obliquely, and poised upon black rings; the second or intermediate pair round, and separated from each other by a space equal to once their individual diameter; posterior row procurved on its inner line and recurved at the rear; side eyes of this row smaller than those constituting the anterior pair, elliptical, oblique, and poised upon black rings; rear intermediate eyes widely separated, small, each touching its lateral neighbour (Pl. xxi., fig. 49). *Legs*.—Moderately long, hairy, tapering, yellow; patellæ i. and ii. each marked with a large and prominent black patch on their outer angle, and broadly pencilled with black on their inner; tibiæ, metatarsi and tarsi i. and ii. broadly pencilled with black on either side; each tibia, metatarsus and tarsus armed with black spines, those on the two first pairs being much the longest and strongest; metatarsi and tarsi i. and ii. scopulated; scopula divided; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, moderately strong, similar in armature and colour to legs i. and ii. *Fulcra*.—Projected well forward, concolorous with cephalothorax, hairy, but displaying naked patches; *radiellum* consists of three transverse rows of teeth; inner ridge of the furrow of each falx armed with a row of seven strong teeth; outer ridge devoid of teeth; between the two ridges there is an intermediate row of eight very small teeth. *Maxillæ*.—Yellow-brown, shining, arched,

hairy, heel well rounded, inner angle obtusely pointed at apex. *Labium*.—Normal, free, concolorous, arched, hairy. *Sternum*.—Pyriform, concolorous also, moderately arched, sparingly hairy; posterior *sigilla* largest, submarginal. *Abdomen*.—Ovate, slightly overhanging base of cephalothorax, clothed with long yellow hairs; superior surface black, marked with five broad, recurved, transverse, yellow bars; inferior surface dull yellow-grey, hairy (Pl. xxi., fig. 50). *Spinnerets*.—Concolorous, hairy; first joint of superior pair longest, third shortest and dome-shaped; inferior pair small, and separated from each other by a space equal to rather more than once their individual diameter.

Hab.—Eidsvold, Queensland.

AGANIPPE PELOCHROA,³ *sp. nov.*

(Pl. xxi., fig. 51.)

♀. Cephalothorax, 8 mm. long, 7.2 mm. broad; abdomen, 10.2 mm. long, 8.9 mm. broad.

Cephalothorax.—Obovate, yellow-brown, arched, sparingly clothed with short fine yellowish hairs and long, dark bristles. *Pars cephalica* ascending, compressed laterally, segmental groove distinct; *ocular area* broader than long, furnished in front and at rear with a few long bristles; *clypeus* broad, sloping forward, slightly excavated at middle, hyaline. *Pars thoracica* uneven, retreating, radial grooves broad and moderately deep; *thoracic fovea* deep, procurved; *marginal band* broad, reflexed, undulated, and fringed with fine hairs. *Eyes*.—Distributed over three rows of 2, 2, 4 each. Anterior pair just touching edge of clypeus, elliptical, poised obliquely, and once-and-a-half their own individual diameter apart; intermediate pair slightly smaller, round, once their own individual diameter apart; each is again removed from its anterior neighbour by about once the diameter of one of the latter eyes; rear row of eyes form a slightly recurved line behind, and a procurved line in front; rear lateral eyes largest of the group, elliptical, and poised obliquely; rear intermediates small, somewhat elliptical, and widely separated from each other; each is also fully once its own individual diameter away from its lateral neighbour (Pl. xxi., fig. 51). *Legs*.—Concolorous with cephalothorax, short, stout, clothed with long dark hairs, but displaying naked areas, and armed with short, stout spines; tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, strong, similar in colour, clothing and armature to legs. *Falces*.—Strong, projecting well forward, shining, reddish-brown, clothed with fine hairs and coarse bristles, but displaying naked areas; *rastellum* spread over an extensive area; lower ridge of the furrow of each falx armed with a row of six strong teeth and the upper with a row of ten smaller teeth; between these rows there is, near the base, an intermediate series of three or four minute teeth; beard, red; *fang* long, dark brown, shining, well curved. *Maxillæ*.—Shining, reddish-yellow, arched, well rounded at heel; the latter not

excavated, clothed with long, dark hairs, and furnished at inner angle near the base with a small cluster of spines; beard yellowish-red. *Labium*.—Concolorous, arched, submerged, short, broader than long, slightly excavated at apex where it has a fringe of stiff bristles; no spines present; a few hairs distributed over the surface. *Sternum*.—Yellow, somewhat pyriform, arched, hairy; posterior *sigilla* large, and away from the margin. *Abdomen*.—Broadly obovate, arched, moderately overhanging base of cephalothorax, clay-yellow, hairy, and marked on superior surface with four muscle spots. *Spinnerets*.—Yellow, hairy, superior pair short, stout, basal joint largest, and the terminal minute and dome-shaped; inferior spinners minute, and separated from each other by about one-half their own individual transverse diameter.

Hub.—Mount Lofty, South Australia.

Genus Anidiops, Pocock.

ANIDIOPS MANSTRIDGEI, Pocock.

(Pl. xxi., figs. 52, 53, 54.)

Anidiops manstridgei, Pocock, Ann. Mag. Nat. Hist. (6), xix., 1897, p. 114; Hogg, Proc. Zool. Soc., 1901, p. 231; *Op. cit.* 1902, p. 125, pl. xiii., fig. 9.

Up to the publication of this paper the female of this species only was known, and that was described from a dried specimen in the British Museum as quoted above. In the material collected by Dr. Pulleine there are half a dozen females and two males, three of the former being adult and three immature; of the mature forms there is one in excellent condition from Port Augusta West, South Australia, which, together with the other specimens bears out Pocock's description, and, except in point of size, Hogg's supplementary remarks and figure. The largest specimen under review shows the following measurements:—Cephalothorax, 11·8 mm. long, 9·5 mm. broad; abdomen, 13·7 mm. long, 10 mm. broad. The type came from Lawler's, East Murchison Goldfields, West Australia. All the examples before us are from South Australia.

Included in the collection are two male specimens from Mallala, South Australia. Both of these are fully developed, and bear a strong superficial resemblance to the males of *Aganippe pulleinei*, Hogg, and *A. subtristis*, O. P. Cambr., but are easily distinguished therefrom by the eye formula. The description is as follows:—

♂. Cephalothorax, 8·8 mm. long, 7 mm. broad; abdomen, 8·4 mm. long, 4·3 mm. broad.

Cephalothorax.—Obovate, yellow-brown, setose. *Pars cephalica* strongly arched, truncated in front, thoracic groove strongly impressed; *ocular area* raised, rather broader than long, well arched; *clypeus* deep, hyaline. *Pars thoracica* broad, moderately arched, radial grooves broad, deep; *thoracic fovea* deep, procurved; *marginal band* pallid, closely fringed with strong, black setæ. *Eyes* arranged in two rows of four each;

anterior row strongly, and the posterior row well procurved; anterior side eyes touching margin of clypeus, elliptical, obliquely placed, and separated from each other by a space equal to about one-half their individual diameter; intermediate eyes round, rather smaller than their lateral neighbours; rear side eyes as large as their anterior lateral, elliptical, and obliquely placed; rear intermediate eyes small, each close to, but not touching, its lateral neighbour (Pl. xxi., fig. 52). *Legs*.—Long, moderately strong, yellow, tapering; each coxa and limb thickly studded with strong black spines, those on the underside of each tibia and tarsus being much the longest and strongest; tarsi i. and ii. scopulated; on tibia i. there is an apophysis (Pl. xxi., fig. 53); relative lengths: 4, 1—2, 3. *Palpi*.—Moderately long, hairy; tibial joint inflated and furnished with an apophysis, the crest of which is spined; tarsal joint reddish, densely hairy, and terminating in front in an obtuse point; palpal bulb reddish, round, hollowed underneath where it is yellowish; stigma long, tapering, acuminate, grooved down the middle to near the centre (Pl. xxi., fig. 54). *Falces*.—Moderately projecting and moderately strong, hairy, but displaying naked patches, dark brown; *rastellum* present, not strong; outer ridge of the furrow of each falx armed with eight teeth and the inner with six; in addition to these there is an intermediate row of five or six very small teeth. *Maxillæ*.—Yellow, arched, hairy, heel well rounded; no teeth present. *Labium*.—Concolorous, short, broad, arched, submerged beneath base of maxillæ, moderately hairy. *Sternum*.—Pyriform, concolorous with labium, arched, moderately hairy, and furnished with setæ; *sigilla* orange-coloured, the anterior marginal; posterior pair largest, in a line between second and third coxæ, and removed from margin. *Abdomen*.—Ovate, slightly projecting over base of cephalothorax, superior surface yellow-brown, hairy, thickly beset with fairly strong spines; inferior surface yellow, hairy. *Spinnerets*.—Superior pair stout, hairy, yellow, first joint longer than second and third combined; the latter shortest and domed; inferior spinners cylindrical, short, and removed from each other by a space equal to fully twice their individual diameter.

Hab.—Two males from Mallala (May, 1910); females from Port Augusta (July 24, 1910); Ambleside (formerly Hahndorf) (November, 1909); and Collinsdale, Barra, South Australia.

Genus *Gaius*, Rainbow.

GAIUS HIRSUTUS, *sp. nov.*

(Pl. xxi., fig. 55.)

♀. Cephalothorax, 13.1 mm. long, 10.8 mm. broad; abdomen, 15.9 mm. long, 11.4 mm. broad.

Cephalothorax.—Obovate, yellow-brown, shining, thickly (but not densely) clothed with fine yellowish hairs. *Pars cephalica* arched, ascending high (but not so much so as in *Missulena*, Walck.), sides steep; thoracic groove well defined; ocular area raised, arched, broader than long, smoky-brown, furnished with a few long bristles; *clypeus* hyaline, broad, sloping, deeply indented at the middle, and having in front of the eyes a

tuft of long, black bristles. *Pars thoracica* moderately broad, arched, retreating rearwards, radial grooves distinct; *thoracic fovea* deep, strongly procurved; *marginal band* broad, sinuous, pallid. *Eyes*.—Distributed over three rows of 2, 2, 4; rear row procurved; anterior eyes large, round; lateral eyes of rear row large, somewhat elliptical, of equal size to those of the front pair, oblique and slightly raised on black rings; front eyes separated from each other by a space equal to once-and-a-half their individual diameter, and from their median neighbours by a space equal to about that of one diameter; median eyes round, small, and separated from each other by a space equal to about once their own individual diameter; rear median eyes round, smaller than the foregoing, widely removed from each other; each is also separated from its lateral neighbour by a space equal to rather more than once its own diameter (Pl. xxi., fig. 55). *Legs*.—Yellow-brown, short, sturdy, thickly clothed with long, coarse bristles, but displaying naked areas; each tibia and metatarsus armed with rather long, moderately strong spines; coxæ long, hairy; metatarsi and tarsi i. and ii. thickly scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Similar in colour and clothing to legs; tibia and tarsus bespined; the latter thickly scopulated. *Falces*.—Projecting well forward, shining, mahogany-brown, densely clothed with long, coarse bristles, but displaying naked areas; *rastellum* consists of a series of strong teeth spread over a rather extensive area; inner ridge of the furrow of each falx armed with seven strong teeth, and the outer with six; in addition to these there is an intermediate row consisting of about a dozen smaller teeth; of the latter those nearest the base are the smallest. *Maxillæ*.—Long, broad, arched, hairy, reddish-brown, heel well rounded, apex of inner angle projected forward, and terminating in an obtuse point; lower portion of inner angle fringed with a beard of long, yellow-grey hairs, and the upper with a beard of red hairs. *Labium*.—Concolorous, shining, arched, free, broader than long, submerged beneath maxillæ, apex procurved, and fringed with coarse bristles. *Sternum*.—Pyriform, elongate, yellow-brown, moderately arched, hairy, terminating in a sub-acute point between fourth pair of coxæ; surface clothed with long, coarse bristles; anterior *sigilla* marginal, intermediate pair submarginal, posterior pair large and removed from margin. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, yellow-brown, arched, hairy. *Spinnerets*.—Short, stout, hairy, concolorous; first joint of superior pair much the longest, and the third minute and dome-shaped; inferior spinners somewhat coniform, and separated from each other by a space equal to about one-half their individual diameter.

Obs.—This is the second species recorded to the genus *Gaius*, Rainb. The first one came from Minnivale, West Australia, and its trap-door was recorded by Mr. W. B. Alexander, as being thin, of the wafer type, but having a few twigs incorporated in its upper surface round the edges.⁴ In respect of the genus itself its natural position should be immediately after *Anidiops*, Pocock.

Hab.—Port Augusta (July, 1909), South Australia.

⁴ Rainbow. —Rec. Austr. Mus., x., 1914, p. 198.

*Genus Blakistonia, Hogg.**BLAKISTONIA AUREA, Hogg.*

(Pl. xiii., fig. 8, Pl. xiv., fig. 6, and Pl. xv., fig. 7.)

Blakistonia aurea, Hogg, Proc. Zool. Soc., 1902, p. 132, pl. xiii., figs. 1 and 2, and text figs. 25b-e.

Obs.—Judged by the number of specimens collected, and the wide range of localities from which they were obtained, this is the commonest Ctenizid in South Australia. Younger specimens are much brighter than the more aged examples. In some specimens the upper surface of the abdomen (female) is sprinkled with groups of very dark spots which when viewed by the naked eye, and in spirit, have the appearance of chevrons.

Blakistonia aurea, Hogg, is the common Ctenizid of the Adelaide Plains. Here it attains its largest size, and the nests as figured are closed by lids which may attain the size of $2\frac{1}{2}$ cm. in diameter.

In favourable situations they are very common. In uncultivated land between Adelaide and the sea there are places where several can be found to the square yard (Pl. xiii., fig. 8), and the whole *Blakistonia* population of the plains must be immense. The economic value of this spider in such great numbers may be easily imagined when we consider that its nocturnal habits enable it to capture larval locusts and dispose of a great number.

In the cultivated lands the tendency of the frequent disturbance is to drive the spiders to the shelter of the fences, and in these positions we find them largely along the highways leaving the city in every direction. Plantations, and especially under pine trees, are favorite spots, but they are often found on hard, much frequented paths. In wet weather the partial filling up of the tube with water does not seem to inconvenience the spider much, and at the back of the Port River, and the reed beds, Adelaide, specimens are found in great abundance in ground that may be submerged for days together.

In the summer, at any rate on the plains, the spider seals its door down by a collar of web reaching from the side of the tube to the margin of the door. This it does to prevent dessication from the air and to protect itself against the parasitic wasps which occasionally use it as food for their larvæ. That this happens is made certain by the occurrence of pupa cases in the empty burrow. At the approach of autumn the nests are unsealed and the lids can be lifted as before. The collar, however, remains as evidence of its having been sealed down.

The male is rarely found in the nest. Most of those found have been collected under stones in cold, wet wintry weather. About April the egg bag is prepared and the eggs laid; the bag is of white silk of a long rectangular form like an ordinary pillow, and is suspended from the sides of the tube by diagonally opposite corners. The height, in one cast, was 2 inches, and the peculiar way of suspending it allows the spider to pass up and down the tube. In June, one of the writers [R.H.P.] found the bag empty and lying detached in the bottom of the tube with first casts inside it and the second on the surface. In the nest, with the mother

are the brood of young ones and they seem to remain there for some months before leaving to form nests in the vicinity of the home. The first nests formed by spiders are only slightly larger than those found in the tube with the mother; the burrows are very small and possess no door; probably this stage is after the third cast. The nest is simply an open tube near these and only little larger are tubes provided with minute doors. From this on, the tubes are enlarged by simply cleaning out and relining and adding concentrically to the door. In original doors the minute one of the first nest may often be traced as the nucleus.

The clearing out process is often undertaken in damp weather, and the first autumn rains are the period of greatest activity. The nests often being surrounded with small fragments of clay and soil, making them appear like anthills. Sometimes, however, the old door is discarded and a new one built. In this case, if built by an adult it is started from the hinge along its whole length, just as it is if the lid had been experimentally removed for observation.

At certain places in the hill country (Mylor, Pewsey Vale, South Australia), the younger nests at least exhibit lids with interlocking dentations into the mouth of the tube. Perfect as the ordinary door is, this modification must make a much greater call on the ingenuity of the *Blakistonians* which are mostly immature.

The female spider is a singularly sluggish animal making no attempt to defend itself unless irritated, when it stands on its hinder two pairs of legs and strikes in the characteristic attitude of the *Territellariæ*.

Hab.—Mitcham, Adelaide (October 26, 1917), Bridgewater (October, 1911), Black Hill, Port Augusta, Port Augusta West (July 24, 1907), Pichi Richi, Leviston, Hope Valley (April, 1908), Canowie (April, 1908), Mallala (April, 1908), Yarcowie, Kalkabury, York Peninsula (March, 1908), Oaklands, Kingswood, Woolshed Flat, South Australia; Broken Hill, New South Wales.

Group ARBANITEÆ.

Genus *Dyarcyops*, Hogg.

Dyarcyops andrewsi, Hogg, and *D. birii*, Kulcz., were, until the publication of this paper, the sole representatives of the genus to which they belong, and to these are now added three more, viz., *D. melancholicus*, *D. ionthus* and *D. maculosus*, each of which is from the vicinity of Sydney. Of these, the first-named, was collected at Clifton Gardens, on the north side of Sydney Harbour, by one of us [R.H.P.], who also collected the last-named at La Perouse, Botany Bay, just as this portion of the paper was being put into type, the second was collected by Mr. Danvers Power, from his garden at Burwood. Judging by *D. ionthus* Hogg's definition of the genus will have to be amended so as to read:—"Thoracic fovea deep, long, straight or slightly procurved." In every respect, save that of the fovea, *D. ionthus* conforms to the original description of the genus.⁵

⁵ Hogg—Proc. Zool. Soc. Lond., 1902, p. 130.

DYARCYOPS ANDREWSI, Hogg.

Dyarcyops andrewsi, Hogg, Proc. Zool. Soc., 1902, p. 180, pl. xiii., fig. 10, and text fig. 25a.

Hab.—Aldgate (May, 21, 1910), Strathalbyn (March 20, 1905), and Keith, South Australia (May 6, 1914).

DYARCYOPS BIRÓI, Kulcs.

(Pl. xiv., fig. 9.)

Dyarcyops birói, Kulcs., Ann. Mus. Nat. Hung., vi., 1908, p. 435.

Obs.—Although the specimen now under review is larger than Kulcsánki's type, and differs in certain minor details from that author's description, I have not much doubt but that the two are synonymous. At any rate until more specimens from New South Wales shall have been collected, I think it better to suspend final judgment.

Hab.—Kaianga, Narooma, New South Wales (January, 1911)

DYARCYOPS MELANCHOLICUS, *sp. nov*

(Pl. xii., fig. 10.)

♂. Cephalothorax, 8.1 mm. long, 7 mm. broad; abdomen, 8.1 mm. long, 5 mm. broad.

Cephalothorax.—Obovate, dark brown (nearly black), hairy, uneven. *Pars cephalica* arched, ascending, truncated in front, thoracic groove distinct; *ocular area* broader than long, raised, arched; *clypeus* deep, slightly inclined inwards, dark brown. *Pars thoracica* rather broad, arched, radial grooves deep; *thoracic fovea* deep, straight; *marginal band* undulating, dark brown, fringed with long hairs. *Eyes.*—Distributed over two rows of four each; front row strongly procurved; rear row procurved; lateral eyes of front row largest of the group, and separated from each other by a space equal to three times their individual diameter, ringed with black, and poised obliquely; intermediate pair smaller, and once their own individual diameter apart; posterior laterals somewhat elliptical, rather smaller than their anterior lateral neighbours, and poised obliquely; rear intermediate eyes minute, widely removed from each other; each touches the ring of its outer neighbour (Pl. xii., fig. 10). *Legs.*—Long, tapering, concolorous with cephalothorax, hairy; tibia i. furnished with an apophysis; tibiae and metatarsi bespined; *metatarsus* and *tarsus* of each leg *accolated*; relative lengths: 4, 1, 2, 3. *Palpi.*—Concolorous with legs, and similar to them in clothing; tibia short, inflated, and furnished with an apophysis; radial joint very short, armed at apex with a number of short, stout spines; bulb shining, pear-shaped; stigma broad at base, obconical, tapering and terminating in a moderately long, slightly twisted style. *Falces.*—Concolorous with cephalothorax, prefrontal moderately strong, clothed with long, coarse bristles, but displaying naked areas; inner angle of the furrow of each falx armed with a row of five moderately strong teeth. *Maxilla.*—Reddish-brown, hairy, slightly ~~enlarged~~, devoid of spines, head well rounded; inner angle fringed with a ~~moderate~~ band.

Labium.—Concolorous, rather longer than broad, arched, hairy. *Sternum*.—Pyriform, elongate, concolorous with foregoing, densely hairy, very slightly arched; *sigilla* small, marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, densely clothed with long, coarse hairs; superior surface and sides dark brown, nearly black; inferior surface yellowish, densely hairy. *Spinnerets*.—Normal, short, stout, hairy, yellowish.

♀. Cephalothorax, 10·7 mm. long, 7·9 mm. broad; abdomen, 9·4 mm. long, 8·2 mm. broad.

Except in point of size, natural sexual differences and the fact that metatarsi and tarsi i. and ii. only in the female are scopulated, the two sexes are remarkably alike. The front lateral eyes are four times their individual diameter apart, and the rear row is procurved. Proportionally the legs of the female are much shorter and stouter; the palpi are long, and similar to leg i. in clothing and armature; tarsus scopulated; the *clypeus* also slopes forward.

Hab.—Clifton Gardens, Sydney (August, 1910), New South Wales.

DIARCIOPS IONTHUS,⁶ *sp. nov.*

(Pl. xxi., fig. 56.)

♀. Cephalothorax, 10·7 mm. long, 7·8 mm. broad, abdomen, 18 mm. long, 8·8 mm. broad.

Cephalothorax.—Obovate, elongate, arched, chocolate-brown, clothed with fine, down-lying, yellowish hairs. *Pars cephalica* moderately high, ascending, segmental groove distinct; *ocular area* raised, broader than long, dark brown, fringed in front with a few stiff bristles; *clypeus* broad, sloping forward, indented at middle, pallid, tinged with brown in front of eyes, at which there is also a tuft of stiff bristles. *Pars thoracica* not broad, uneven, retreating, radial grooves moderately distinct; *thoracic fovea* long, deep, slightly procurved; *marginal band* broad, pallid, sinuous, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each, the front row being strongly procurved, and the rear moderately so; front lateral eyes largest of the series, each rather more than once its own individual diameter from its median neighbour; front median eyes about once their own individual diameter apart; rear lateral eyes rather smaller than the anterior medians, and about twice their own individual diameter from their front lateral neighbours; rear medians very small, widely removed from each other, and each again separated by about one and a half its own diameter from its lateral neighbour (Pl. xxi., fig. 56). *Legs*.—Short, strong, clay-yellow, hairy but displaying naked areas, each armed with long, fine spines; metatarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3, the fourth leg being but slightly longer than the first. *Palpi*.—Moderately long, strong, similar in colour, clothing and armature to legs; tarsi scopulated. *Falces*.—Dark brown, moderately projected, strong, arched, densely clothed with short, fine hairs and long, coarse bristles;

⁶ *laevius* = clothed with fine hairs.

inner ridge of the furrow of each falx armed with a row of ten strong teeth, and the outer with thirteen small ones; beard red; *fang* long, well curved, nearly black. *Maxillæ*.—Dark brown, arched, densely clothed with long hairs, heel well rounded; beard red. *Labium*.—Concolorous, short, broad as long, submerged, arched, hairy, apex straight, and fringed with long bristles. *Sternum*.—Concolorous also, arched, densely hairy, broadest opposite third pair of coxæ; anterior and median *sigilla* marginal, the posterior submarginal. *Abdomen*.—Oblong-obovate, slightly overhanging base of cephalothorax, arched, dark chocolate brown, densely clothed with fine dark hairs, and showing towards anterior extremity two well defined muscle spots. *Spinnerets*.—Clay-yellow, short, stout; the superior pair has the basal joint longer than the second and third combined; the third joint minute, dome-shaped; inferior spinners scarcely once their individual transverse diameter apart.

Obs.—No lid to nest.

Hub.—Burwood, Sydney (February 23, 1918), New South Wales.

DIARCYOPS MACULOSUS, *sp. nov.*

(Figs. 2 and 3.)

♀. Cephalothorax, 6·2 mm. long, 4·4 mm. broad; abdomen, 9·5 mm. long, 5·1 mm. broad.

Cephalothorax.—Obovate, arched, yellow-brown, clothed with fine silky hairs. *Pars cephalica* ascending, high, segmental groove distinct; *ocular area* broader than long, fringed in front with long, stout bristles; *clypeus* hyaline, sloping forward, undulating. *Pars thoracica* not broad, uneven, radial grooves distinct; *thoracic fovea* straight; *marginal band* broad, pallid, undulating. *Eyes*.—Distributed over two rows of four each, the front one being strongly procurved, and the rear moderately so; eyes of front row of equal size, round, the intermediate pair separated from each other by a space equal to that of fully once their own individual diameter, and each again from its lateral neighbour by somewhat less than that space; rear lateral eyes rather smaller than their anterior neighbours; rear intermediates much the smallest of the series, and each quite close to, but not touching its lateral neighbour (Fig. 2).

Legs.—Short, concolorous with cephalothorax, spined, densely hairy, but displaying naked areas; metatarsi and tarsi i. and ii. scopulated; superior claws long; relative lengths: 4, 1, 2, 3.

Palpi.—Long, similar in colour, clothing and armature to legs; tarsi scopulated. *Fulcra*.—

Dark brown, shining, moderately projected, strong, arched, densely clothed with dark brown hairs; inner ridge of the furrow of each falx armed with six strong teeth, and the outer with seven smaller ones; between these two series there is at the base a double row of eight or nine minute teeth; *rastellum* consists of a couple of rows of stout teeth; *fang* long, dark brown, well curved. *Maxillæ*.—Dull yellowish, arched, shining, moderately hairy; beard long, foxy-red, heel well rounded. *Labium*.—Concolorous, short, arched, shining,

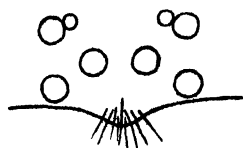


Fig. 2.

apex straight, and fringed with dark bristles. *Sternum*.—Concolorous also, hairy, arched, broadest between third pair of coxæ; *sigilla* small, round, yellow, posterior pair submarginal. *Abdomen*.—Obovate, not overhanging base of cephalothorax; arched; superior surface and sides yellow, flecked and spotted with chocolate-brown (Fig. 3), moderately hairy; immediately in front of *rima epigasteris* there is a rather large and prominent patch of orange-red. *Spinnerets*.—Yellow. First segment of superior pair longer than the second and third combined; terminal segment dome-shaped; inferior spinners short, and separated from each other by a space equal to once their own individual transverse diameter.



Fig. 3.

Hab.—La Perouse, Botany Bay, New South Wales (November 9, 1918).

Genus Arbanitis, L. Koch.

Three species only of this genus have up to the present been made known from Australia, viz., *A. longipes*, L. Koch, *A. maculipes*, Hogg, and *A. fuscipes*, Rainb., the first named hailing from Queensland, the second from Tasmania, and the third from New South Wales. Koch's species was described from a male only, but in 1914 one of the writers of this paper [W.J.R.] described that which he took to be the female. Two examples were recorded on that occasion, one being from Eidsvold, and the other from Burnett River, Queensland. The present collection contains another specimen from a locality near Eidsvold. To these nine additional forms are now recorded.

In elucidation of the species, we submit the following table:—

Front middle eyes about one half their individual diameter apart (<i>sec. L. Koch</i>).....	<i>A. longipes</i> , L. Koch.
Front middle eyes one third their individual diameter apart; thoracic fovea very deep, broad, slightly procurved.....	<i>A. fuscipes</i> , Rainb.
Front middle eyes nearly twice their individual diameter apart; thoracic fovea straight, but slightly curved round base of cephalic part.....	<i>A. maculipes</i> , Hogg.
Front middle eyes once their individual diameter apart, thoracic fovea slightly procurved; abdomen marked with broken transverse yellow bars.....	<i>A. gracilis</i> , sp. nov.
Front middle eyes about once their own individual diameter apart; thoracic fovea deep, procurved; abdomen chocolate brown with yellow markings and transverse bars.....	<i>A. festinus</i> , sp. nov.
Front middle eyes rather small, about once their individual diameter apart; thoracic fovea procurved; abdomen ornamented with yellow spots and markings.....	<i>A. similis</i> , sp. nov.
Front middle eyes fully once their individual diameter apart; thoracic fovea straight; abdomen chocolate brown marked with yellow.....	<i>A. pulchellus</i> , sp. nov.
Front median eyes three fourths their individual diameter apart; thoracic fovea straight; abdomen yellow, marked with chocolate brown.....	<i>A. elegans</i> , sp. nov.

Front median eyes one half their individual diameter apart; thoracic fovea procurved, abdomen chocolate brown, spotted with yellow.....

A. incornatus, sp. nov.

Front median eyes not more than one half their individual diameter apart; thoracic fovea straight; abdomen densely hairy.....

A. hirsutus, sp. nov.

Front median eyes not more than one half their individual diameter apart; thoracic fovea straight; abdomen closely studded with papillae, each of which carries a short black bristle.....

A. papillosus, sp. nov.

Front middle eyes of ♂ less than once their own individual diameter apart, and the front laterals, again, twice their own individual diameter from each other; tibial joint of palpus inflated and furnished with a spined apophysis. Front middle eyes of ♀ once their own individual diameter apart, and the front laterals three times their own individual diameter from each other.....

A. montanus, sp. nov.

ARBANITIS P LONGIPES, L. Koch.

Pholeuon longipes, L. Koch, Die Arach. des Austr., i., 1874, pp. 472 and 491, pl. xxxvi., figs. 3, 3a, 3b, 3c.

Arbanitis longipes, Hogg, Proc. Zool. Soc., 1901, p. 236; Rainb., Rec. Austr. Mus., iv., 1901, p. 7; *Op. cit.*, x., 1914, p. 213, figs. 26, 27.

Hab.—Near Eidsvold, Queensland.

ARBANITIS GRACILIS, sp. nov.

(Pl. xxii., figs. 57 and 58.)

♀. Cephalothorax, 8.5 mm. long, 5.5 mm. broad; abdomen, 11.5 mm. long, 6.7 mm. broad,

Cephalothorax.—Obovate, yellow-brown, pilose. *Pars cephalica* ascending, well arched, sides steep, compressed, thoracic groove well defined; *ocular area* raised, broader than long; *clypeus* deep, sloping forward, hyaline, indented at middle. *Pars thoracica* elongate, arched, uneven, radial grooves distinct; *thoracic fovea* very slightly procurved; *marginal band* pallid, undulating, fringed with a few fine hairs, and a few short, black bristles. *Eyes*.—Compact, distributed over two rows of four each; front row strongly procurved; anterior side eyes elliptical, poised obliquely, and separated from each other by a space equal to fully twice their individual diameter; anterior median eyes small, round, and separated from each other by a space equal to once their individual diameter; rear row distinctly procurved on the front line and strongly recurved at the rear; posterior laterals nearly as large as their anterior lateral neighbours, and poised obliquely; posterior medians minute, widely separated, each touching its outer neighbour; each eye of both series ringed with black: there is a dark, smoky patch between, and well to, the rear of anterior median eyes; front laterals quite close to margin of clypeus (Pl. xxii., fig. 57). *Legs*.—Concolorous with cephalothorax, strong, moderately long, hairy; metatarsi i. and ii. armed with six long, strong spines underneath, and tarsi i. and ii. with four rather short, stiff spines near the claws; leg iii. has the patella, tibia, and metatarsus strongly bespined in front and laterally, and the tarsus likewise underneath; patella iv. has a few short spines laterally; there are traces of spinal armature on tibia of leg iv.,

but the spines have been broken off; metatarsus and tarsus of the same leg strongly armed; spines on metatarsus very long; metatarsi and tarsi of legs i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour and clothing to legs, armed laterally with a few long, strong spines, tarsus scopulated; claw long. *Falces*.—Long, moderately strong, projected well forward, concolorous with cephalothorax, sides and apices clothed with long hairs; *rastellum* spread over a somewhat extensive area, the teeth strong; upper ridge of the furrow of each falx armed with four strong teeth, and the lower with six small ones; in addition to these there is an inner row consisting of three or four minute teeth; *fang* long, well curved. *Maxillæ*.—Yellow, moderately long, hairy, arched, obtusely pointed at base, inner angle bearded, and terminating at apical extremity in an obtuse point; there are a few small spines near the inner angle toward posterior extremity. *Labium*.—Short, broad, concolorous, submerged, arched, truncated, hairy, apex rounded; no spines present. *Sternum*.—Pyriform, arched, concolorous with foregoing, clothed with black bristly hair, posterior extremity terminating obtusely between fourth pair of coxæ; *sigilla* orange-coloured, marginal. *Abdomen*.—Obovate, hairy, very slightly overhanging base of cephalothorax; superior surface chocolate brown with yellow markings; the first pair are seated well forward, are nearly round, and widely separated; the second pair are somewhat larger and elliptical; the third are larger still, but also elliptical; the three remaining yellow markings are broad and take the form of slightly recurved transverse bands (Pl. xxii., fig. 58); sides chocolate brown also with broad yellow markings interrupted with chocolate brown spots; these markings are associated with those on the upper surface; inferior surface ochreous yellow, moderately irrorated with small reddish-brown and chocolate spots. *Spinnerets*.—Superior pair chocolate brown, hairy; first joint longest, the third shortest and dome-shaped; inferior spinners concolorous, hairy, short, cylindrical, and separated from each other by a space equal to once their individual diameter.

Obs.—The type specimen was collected by one of us [R.H.P.], and the others by Mr. Chas. Danvers Power. Included among the latter is one that has newly cast its skin, and its predominant colour is pale green. The species displays some little variation in the yellow abdominal markings; in some examples they are broad, in others narrow. *A. gracilis* is common around Sydney. It may be looked for on both sides of the harbour. Some years ago one of us [W.J.R.] took it in the vicinity of Mrs. Macquarie's Chair and on the site where the power-house now stands at Rushcutters' Bay.

Hab.—Domain, Sydney; Burwood, Sydney (April, 1918), New South Wales.

ARBANITIS FESTIVUS, *sp. nov.*

(Pl. xxii., fig. 59.)

♀. Cephalothorax, 9.3 mm. long, 7.8 mm. broad; abdomen, 12.8 mm. long, 8.8 mm. broad.

Cephalothorax.—Obovate, reddish-brown, arched, moderately pubescent. *Paræ cephalica* ascending, high, sides compressed, a row of bristles

running down the middle, segmental groove distinct; *ocular area* raised, broader than long, black, furnished in front with a tuft of bristles; *clypeus* hyaline, sloping forward, excavated at middle. *Pars thoracica* retreating, uneven, radial grooves broad and deep; *thoracic fovea* deep, procurved; *marginal band* broad, undulated, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each, the front row being procurved and the rear recurved; front side eyes largest of the group, elliptical, poised obliquely, and separated from each other by fully three times their own individual diameter; median eyes round, and separated from each other by a space equal to once their own individual diameter; posterior side eyes larger than their anterior lateral neighbours, elliptical, and poised obliquely; rear intermediates smallest of the group, nearly round, widely separated, each just touching its lateral neighbour (Pl. xxii., fig. 59). *Legs*.—Concolorous with cephalothorax, short, sturdy, hairy, but displaying naked areas, armed with powerful spines, those on legs i. and ii. being the strongest and most numerous; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Short, strong, similar in colour, clothing and armature to legs i. and ii.; tarsi scopulated. *Fulces*.—Concolorous with cephalothorax, projected well forward, clothed with fine hairs and coarse bristles; inner ridge of the furrow of each falx armed with six strong teeth, and the outer with seven smaller ones; in addition to these there is an intermediate series of three minute ones; *fang* nearly black, shining, strong, well curved. *Maxille*.—Yellow, arched, hairy, excavated round the lip, furnished with a cluster of spines at inner angle; heel well rounded. *Labium*.—Concolorous, short, broad, arched, apex slightly excavated and fringed with bristles; a few bristles distributed over surface. *Sternum*.—Concolorous also, narrow in front, broadest between third coxæ, and terminating obtusely between fourth pair of coxæ, arched, clothed with black bristles; posterior *sigilla* large, submarginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, hairy; superior surface chocolate-brown with yellow markings and transverse bars; inferior surface yellow, clothed with dark brown hairs. *Spinnerets*.—Yellow, hairy; superior pair stout, tapering, basal joint longer than the second and third combined, the latter minute and dome-shaped; inferior spinners very short, stout, and separated from each other by a space equal to fully once their own individual diameter.

Obs.—Several matured examples collected by one of us [R.H.P.]. Very like *A. gracilis* (ante p. 110), by its abdominal ornamentation, but it may be easily distinguished therefrom by its larger size and broader eye place. The entrance to the burrow is protected by a thick lid. The ova-sac is elliptical, composed of a thin white silken tissue, and is tough and strong. It is 24.5 mm. long, and 13 mm. wide.

Hab.—Mannup, Blackwood River, South West Australia (December 9, 1917.)

ARRANITIS SIMILARIS, *sp. nov.*

(Pl. xxii., fig. 60.)

♀. Cephalothorax, 8.7 mm. long, 7.2 mm. broad; abdomen, 10.7 mm. long, 7.2 mm. broad.

Cephalothorax.—Obovate, yellow, moderately clothed with fine yellow downy hairs. *Pars cephalica* high, arched, ascending, segmental groove distinct, slightly compressed at sides; *ocular area* broader than long, raised, arched, dark brown; between and in front of the eyes there are a few moderately strong bristles; *clypeus* hyaline, moderately deep, sloping forward, indented at middle. *Pars thoracica* arched, uneven, retreating rearwards, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* pallid, fringed with long, fine hairs. *Eyes*.—Distributed over two rows of four each; front row procurved; second row recurved on its rear line, and procurved in front; anterior laterals slightly larger than their rear neighbours and separated from each other by a space equal to twice their individual diameter, somewhat elliptical, and poised obliquely on black rings; front medians rather small, round, and separated from each other by a space equal to once their own individual diameter; rear laterals rather smaller than their anterior lateral neighbours, elliptical, oblique, and poised upon black rings; rear medians smallest of the group, nearly round, and widely separated, each just touching its lateral neighbour (Pl. xxii., fig. 60). *Legs*.—Concolorous with cephalothorax, moderately long and strong, hairy, but displaying naked areas; tibiae, metatarsi and tarsi i. and ii. armed with stout spines, the metatarsal ones being much the longest; legs iii. and iv. are also similarly armed, but the spines are not so strong as those on the front legs, metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, moderately strong, similar in colour, clothing and armature to legs i. and ii; tarsus scopulated. *Palpes*.—Projecting, shining, yellow-brown, clothed with hairs and long, coarse bristles, but displaying large naked areas; *rastellum* consists of three transverse rows of strong teeth; inner ridge of the furrow of each palx armed with five strong teeth, and the outer with ten small ones, of which the basal four are decidedly the smallest, in addition to these there is at the base an intermediate row of four or five minute teeth. *Maxillae*.—Yellow, shining, hairy, heel well rounded, no spines present. *Labium*.—Rather longer than broad, yellow, shining, arched, moderately hairy. *Sternum*.—Pyriform, yellow, hairy, moderately arched; posterior *sigilla* large and away from margin. *Abdomen*.—Ovate, slightly overhanging base of cephalothorax, arched; superior surface clothed with fine hairs and a few coarse bristles, yellow-brown, irrorated with small yellow spots; in addition to these there are two widely separated moderately large spots near the front; towards the middle there are two others which are rather larger and also widely separated; beneath these again there are two more, larger still, and elliptical in form; from thence toward the spinnerets there are four interrupted procurved, transverse yellow bars; inferior surface ochreous yellow, hairy. *Spinnerets*.—Short, concolorous, hairy; first joint of superior pair longest, the third shortest and dome-shaped; inferior spinners short, cylindrical, and separated from each other by a space equal to that of once their own individual transverse diameter.

Obs.—Superficially very similar to *A. quactis*, sp. nov., but easily distinguished therefrom by its relatively broader prothorax.

Hab.—Kedron Brook, Brisbane, Queensland.

ARBANITIS PULCHELLUS, *sp. nov.*

(Pl. xiv., fig. 11, and Pl. xxii., figs. 61, 62.)

♀. Cephalothorax, 11.6 mm. long, 7 mm. broad; abdomen, 14 mm. long, 8.8 mm. broad (Pl. xiv., fig. 11).

Cephalothorax.—Dark mahogany brown, pubescent, somewhat obovate. *Pars cephalica* strongly arched, raised, ascending, sides declivous, compressed, truncated in front; *ocular area* broader than long, raised, arched, fringed in front with short spines; *clypeus* deep, hyaline, indented at the middle. *Pars thoracica* uneven, arched, radial grooves distinct, sides undulating; *thoracic fovea* deep, straight; *marginal band* broad, pallid, fringed with black hairs. *Eyes*.—Arranged in two rows of four each; anterior row strongly procurved, rear recurved; the lateral eyes of front row largest of the group, somewhat elliptical, oblique, and separated from each other by a space equal to three times their individual diameter; anterior median eyes round, and separated from each other by a space equal to fully once their individual diameter; rear lateral eyes scarcely as large as their anterior median neighbours; rear median eyes smallest of the group and widely separated from each other; each is close to but does not touch its lateral neighbours; all eyes ringed with black (Pl. xxii., fig. 61). *Legs*.—Strong, moderately long, concolorous with cephalothorax, hairy, but displaying naked patches; each tibia, metatarsus and tarsus bespined, those on legs i. and ii. the longest and strongest; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, similar in colour, clothing and armature to leg i.; tarsus scopulated. *Fulcra*.—Projected well forward, dark brown, hairy, but displaying naked patches; outer margin of the furrow of each falx armed with eight strong teeth, and the inner with six smaller ones; between these there is an intermediate row consisting of two small teeth; *rastellum* consists of three transverse rows of teeth; *fung* long, well curved, shining, dark brown, almost black. *Murillæ*.—Reddish-brown, hairy, arched, heel well rounded, inner angle at anterior extremity terminating in an obtuse point, and obliquely directed; no spines present. *Labium*.—Concolorous, arched, hairy, anterior angle curved. *Sternum*.—Pyriform, arched, yellow, suffused at sides with brown; clothed with short black bristly hairs, posterior extremity terminating obtusely between fourth pair of coxæ; *sigilla* marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax; superior surface dark brown, marked down the middle with a narrow somewhat interrupted yellow line, on either side of which are yellow spots and markings, the latter having the appearance of broken transverse bands; sides dark brown also, with broken yellow markings; inferior surface hairy, yellow, marked laterally with dark brown spots (Pl. xxii., fig. 62). *Spinnerets*.—Yellow, hairy; superior spinners have the first joint much the longest, and the apical, which is domed, is shorter than the second; inferior spinners very short, and separated from each other by a space equal to once their individual diameter.

Hab.—Tambourine Mountain, Queensland.

ARBANITIS ELEGANS, *sp. nov.*

(Pl. xxii., fig. 63.)

♀. Cephalothorax, 9.1 mm. long, 7.4 mm. broad; abdomen, 10.5 mm. long, 9.4 mm. broad.

Cephalothorax.—Obovate, yellow-brown, rather well clothed with long, fine yellowish hairs. *Pars cephalica* arched, high, ascending, segmental groove well defined; *ocular area* broader than long, raised, arched, dark brown; *clypeus* sloping forward, hyaline, tinged with yellowish-brown at the middle, where it is slightly excavated. *Pars thoracica* moderately broad, radial grooves distinct; *thoracic fovea* moderately deep, straight; *marginal band* pallid, fringed with long, fine, yellowish hairs. *Eyes*.—Distributed over two rows of four each; front row well procurved, the rear recurved on its front line and recurved behind; eyes of front row of nearly equal size; front laterals slightly the largest, somewhat elliptical, and separated from each other by a space equal to fully two-and-a-half times their individual diameter, and the medians, which are round, from each other by about three-quarters of a diameter; rear lateral eyes smaller than those of the front row, somewhat elliptical, and poised obliquely; rear median eyes minute and widely separated from each other; each is close to but does not touch its lateral neighbour (Pl. xxii., fig. 63). *Legs*.—Moderately long and moderately strong, yellow-brown; the two front pairs have dark brown patches on the outer angles of their patellæ and tibiæ; each ambulatory limb densely hairy, but displaying naked areas; all are well armed with long black spines, those on leg iv. being the weakest; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, moderately strong, yellow-brown, densely hairy, and armed with long, strong spines; tarsus scopulated. *Falces*.—Projected, dark brown, densely clothed with short hairs and long coarse bristles, and displaying no naked areas; inner angle of the furrow of each falx armed with six strong teeth, and the outer with seven or eight very small ones; *ras-tellum* consists of two transverse rows of long, strong teeth; *fang* long, black, shining, moderately well curved. *Maxilla*.—Reddish-brown, densely hairy, arched, heel obtusely pointed, a few small scattered spines at base of inner angle, which latter has a beard of long yellow and red hairs. *Labium*.—Concolorous, longer than broad, hairy, arched, submerged and furnished with a few short spines. *Sternum*.—Rather broad, pyriform, arched, clothed with yellowish hairs and long black bristles and terminating obtusely between fourth pair of coxæ; *sigilla* marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, moderately clothed with short yellowish hairs and rather long, black bristles: superior surface and sides yellow, maculated with chocolate brown, some of the maculations being so grouped and disposed as to form gently recurved but interrupted transverse bars; inferior surface golden yellow, spotted with chocolate brown, hairy; the chitinous plate immediately above *rima epigustica* bright red in front. *Spinnerets*.—Golden yellow, hairy, basal joint of inferior pair twice as long as that of the second; third much the shortest and dome-shaped; inferior pair minute, close together.

Hab.—Kaianga, Narooma, New South Wales.

ARBANITIS MIRSUTUS, *sp. nov.*

(Pl. xxii., fig. 64.)

♀. Cephalothorax, 8·9 mm. long, 7·1 mm. broad; abdomen, 7·2 mm. long, 5 mm. broad.

Cephalothorax.—Obovate, reddish-brown, moderately hairy. *Pars cephalica* strongly arched, ascending, somewhat compressed laterally, thoracic groove distinct; ocular area broader than long, raised, arched, furnished in front between anterior eyes with a few black bristles; *clypeus* hyaline, sloping forward, gently undulating. *Pars thoracica* moderately broad, arched, retreating towards posterior angle, radial grooves broad, distinct; *thoracic fovea* deep, straight; *marginal band* moderately broad, fringed with long hairs. *Eyes*.—Distributed over two rows of four each; front row strongly procurved; the rear recurved behind, and procurved in front; anterior and posterior side eyes largest, of equal size, elliptical, poised obliquely, and mounted on black rings; front lateral eyes very nearly touching edge of clypeus and separated from each other by a space equal to fully twice their individual diameter; anterior median eyes smaller than their lateral neighbours, round, ringed with black, and separated from each other by a space equal to not more than one-half their own individual diameter, rear median eyes smallest of the group, widely removed from each other, each just touching the ring of its lateral neighbour (Pl. xxii., fig. 64). *Legs*.—Concolorous with cephalothorax, clothed with coarse hairs and bristles, but displaying naked areas; tibiae and metatarsi armed with long, strong, black spines; on tarsus iii. there are six short spines; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour and clothing to legs; tibia armed with ten long, strong, black spines, and tarsus with two; the latter joint scopulated. *Falces*.—Concolorous with cephalothorax projecting, clothed with coarse hairs and bristles, but displaying naked areas: inner angle of the furrow of each falx armed with nine strong teeth, and the outer with seven small ones; *rastellum* consists of a couple of transverse rows of rather small teeth; *fang* long, shining, well curved, dark brown. *Maxillae*.—Reddish-brown, moderately arched, hairy, heel well rounded, at the inner basal angle there is a cluster of small spines. *Labium*.—Concolorous, longer than broad, arched, hairy, apex slightly excavated; no spines present. *Sternum*.—Concolorous with labium, pyriform, elongate, moderately arched, hairy; *sigilla* small, marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, chocolate brown, arched, densely hairy. *Spinnerets*.—Yellow, hairy, first joint of superior pair longest, the third shortest; inferior spinners cylindrical, very short, and separated from each other by a space equal to not more than that of once their individual transverse diameter.

Obs.—Probably a not fully grown example; nevertheless it is a very distinct form.

Hab.—Kedron Brook, Brisbane, Queensland.

ARBANITIS MONTANUS, *sp. nov.*

(Pl. xxii., figs. 65, 66, 67 and 68.)

♂. Cephalothorax, 6·8 mm. long, 5·5 mm. broad; abdomen, 6·7 mm. long, 3·8 mm. broad.

Cephalothorax.—Obovate, yellow-brown, moderately clothed with fine yellow hairs. *Pars cephalica* arched, ascending, segmental groove distinct; *ocular area* broader than long, arched, black, fringed in front with black bristles; *clypeus* hyaline, deep, sloping forward, deeply indented at middle. *Pars thoracica* arched, moderately broad, uneven, retreating rearwards, radial grooves distinct; *thoracic fovea* deep, very slightly recurved; *marginal band* undulated, pallid, fringed with rather coarse hairs. *Eyes*.—Distributed over two rows of four each; front row strongly procurved, the rear procurved in front and recurved behind; anterior laterals slightly larger than front medians and largest of the group, elliptical, mounted on black rings, poised obliquely, and separated from each other by a space equal to twice their individual diameter; anterior medians round, quite close together, ringed with black, rear laterals smaller than their anterior neighbours, elliptical, ringed with black, and poised obliquely; rear medians minute, widely separated, each touching its lateral neighbour (Pl. xxii., fig. 65). *Falces*.—Projected, moderately strong, concolorous with cephalothorax, clothed with short hairs and long stiff bristles, but displaying naked areas; inner angle of the furrow of each falx armed with six strong teeth and the outer with several minute ones. *Legs*.—Long, concolorous with cephalothorax, tapering, hairy, but showing naked areas; tibia i. furnished with an apophysis (Pl. xxii., fig. 66); each tibia and metatarsus bespined; metatarsi and tarsi i. and ii. scopulated; tarsi iii. and iv. are also scopulated; relative lengths: 1-4, 2, 3. *Palpi*.—Rather short, similar in colour and clothing to legs; tibia inflated, and furnished with a spined apophysis; tarsal joint small, and furnished at apex with a series of short spines; bulb bilobed, shining, pyriform, and terminating in a long, fine style; lobes mahogany brown; space between the latter yellow (Pl. xxii., fig. 67). *Maxillæ*.—Arched, clay yellow, hairy, heel well rounded at base, inner angle fringed with an orange-yellow beard, the apex terminating in an obtuse point; no spines present. *Labium*.—Concolorous, moderately hairy, arched, broader than long. *Sternum*.—Pyriform, concolorous also, moderately arched, hairy; *sigilla* marginal. *Abdomen*.—Ovate, slightly overhanging base of cephalothorax, arched, hairy, superior surface yellow with dark brown markings and slightly recurved transverse bars; sides and inferior surface yellow, hairy. *Spinnerets*.—Concolorous, hairy, normal; inferior pair separated from each other by a space equal to once their individual transverse diameter.

♀. Cephalothorax, 10·2 mm. long, 7·2 mm. broad; abdomen, 13·4 mm. long, 8·2 mm. broad.

Cephalothorax.—Obovate, yellow-brown, moderately clothed with fine yellow hairs, uneven. *Pars cephalica* ascending, arched, segmental groove distinct; *ocular area* broader than long, raised, arched, fringed in front with a tuft of stiff bristles; *clypeus* pallid, tinged with yellowish at the middle, deep, sloping forward, moderately excavated at the middle, and furnished in front with a tuft of stiff bristles. *Pars thoracica* arched, radial grooves broad, distinct; *thoracic fovea* deep, straight; *marginal band* undulated, rather pallid, fringed with long, fine hairs. *Eyes*.—Distributed over two rows of four each; front row strongly procurved, the rear slightly procurved in front and distinctly recurved behind; anterior laterals largest of the group, very slightly elliptical, ringed with black, poised

obliquely, and separated from each other by a space equal to fully three times their individual diameter; anterior medians slightly smaller, round, ringed with black, poised obliquely, and separated from each other by a space equal to that of once their own individual diameter; rear laterals slightly smaller than their anterior lateral neighbours; they are also ringed with black, are elliptical, and poised obliquely; posterior medians minute, round, and widely separated, each one just touching its lateral neighbour (Pl. xxii., fig. 68). *Legs*.—Rather short, sturdy, concolorous with cephalothorax, densely hairy, but displaying naked areas; each ambulatory limb armed with a few strong spines; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour, clothing and armature to leg i., tarsus scopulated. *Fulcres*.—Projected forward, moderately strong, darker in colour than cephalothorax, clothed with short hairs and long, coarse bristles; inner margin of the furrow of each falx armed with a row of eight strong teeth, and the outer with a row of five small teeth; *rustellum* consists of three transverse rows of rather strong teeth; *fang* long, nearly black, well curved. *Maxillæ*.—Dark reddish-brown, arched, hairy, heel well rounded, inner angle fringed with a beard of reddish hairs, and terminating at apex in an obtuse point; a few small scattered spines at base. *Labium*.—Concolorous, well arched, longer than broad, hairy, devoid of spines, apex excavated. *Sternum*.—Concolorous also, pyriform, arched, hairy, terminating obtusely between fourth pair of coxæ; *sigilla* small, first two pairs marginal, posterior pair submarginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, hairy; superior surface and sides yellow, irrorated with chocolate brown; inferior surface yellow, hairy. *Spinnerets*.—As in the male.

Obs.—One adult male, and several females in various stages of development were collected. In none of the latter is there any distinct design, although in some of the younger forms there are traces of chocolate brown transverse bars.

Hab.—Jenolan Caves, New South Wales.

ARRANITIS PAPILLIOSUS, *sp. nov.*

(Pl. xxii., fig. 69.)

♀. Cephalothorax, 10.2 mm. long, 7.7 mm. broad; abdomen, 12.4 mm. long, 9.6 mm. broad.

Cephalothorax.—Obovate, pilose. *Pars cephalica* raised, well arched, ascending, compressed laterally, thoracic groove well defined; *ocular area* broader than long, fringed in front with a tuft of stiff black bristles; anterior lateral eyes close to edge of clypeus; *clypeus* hyaline, moderately deep, sloping gently forward, undulated. *Pars thoracica* uneven, moderately arched, radial grooves distinct; at rear of thoracic fovea there are two depressions or pits; *thoracic fovea* moderately deep, straight; *marginal band* moderately broad, undulating, yellowish, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each; anterior row strongly procurved; rear row procurved in front, recurved behind; anterior and posterior lateral eyes of nearly equal size, the latter being slightly the smallest, elliptical, ringed with black, and poised obliquely; front lateral

eyes separated from each other by a space equal to that of four times their individual diameter; anterior medians largest of the group, round, and one-half their individual diameter apart; rear medians round, smallest of the group, widely separated, each touching its lateral neighbour (Pl. xxii., fig. 69). *Legs*.—Rather long, moderately strong, tapering, clothed with short, stiff, black hairs, but displaying naked patches; tibia, metatarsus and tarsus of each leg armed with moderately long, black spines: metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, moderately strong, similar in colour and armature to legs; tarsi scopulated. *Falces*.—Rather short, moderately projecting, dark mahogany brown, thickly clothed with short hairs and stiff black bristles, but displaying naked patches; inner angle of the furrow of each falx armed with a row of seven strong teeth; outer angle armed with a row of nine small teeth, of which the three at the base are decidedly the smallest; between the two ridges there is an intermediate row consisting of three minute teeth; *rastellum* rather weak; *fang* well curved, dark reddish-brown. *Maxillæ*.—Yellow, hairy, obtusely pointed at base, and again at apex of inner angle; there is a small cluster of spines at base of inner angle. *Labium*.—Concolorous, rather longer than broad, arched, apex very slightly excavated, moderately clothed with stiff black bristles. *Sternum*.—Pyriform, arched, yellow, clothed with long black bristles, and terminating obtusely between fourth pair of coxæ; *sigilla* small, marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax; superior surface chocolate-brown, closely and thickly studded with small yellow papillæ, at the summit of each of which there is a small, black bristle: towards the middle there is a small, pale yellow patch, which latter has but few papillæ; below this there are two short, but widely separated, curved, transverse yellow bars; below the latter there are two larger ones, and below these again two others, between which there is a moderately large, irregular spot; sides and inferior surface yellow-brown, hairy. *Spinnerets*.—Yellow, hairy, basal joint smallest, dome-shaped; inferior spinners minute, once their individual diameter apart: apices obliquely truncated.

Obs.—This may hereafter form the type of a new genus, from the fact that the anterior median eyes are the largest of their group, the falces being only slightly projected, and the inferior spinnerets obliquely truncated. For the present, however, it is included in the genus *Arbanitis*:

Hab.—Tambourine Mountain, Queensland

ARBANITIS INORNATUS, *sp. nov.*

(Pl. xxii., fig. 70.)

♀. Cephalothorax 9 mm. long, 6.8 mm. broad; abdomen 10.4 mm. long, 6.8 mm. broad.

Cephalothorax.—Obovate, uneven, reddish-brown with pale yellowish patches, pubescent. *Pars cephalica* raised, well arched, ascending, thoracic groove distinct, sides compressed, fringed with stout black bristles in front of eyes; *ocular area* broader than long; *clypeus* hyaline, sloping forward, moderately deep, slightly indented at the middle. *Pars thoracica*

moderately broad, arched, radial grooves distinct; *thoracic fovea* deep, very slightly procurved; *marginal band* moderately broad, hyaline, fringed with rather long black hairs. *Eyes*.—Arranged in two rows of four each; anterior row strongly procurved; posterior row recurved on its rear line and procurved in front; anterior and rear laterals elliptical, oblique, and of nearly equal size, the latter being slightly the larger; anterior laterals separated from each other by a space equal to about two-and-a-half times their individual diameter; anterior medians, one-half their individual diameter apart, round, large; rear medians small, widely separated, each one touching the black ring of its lateral neighbour; all eyes ringed with black (Pl. xxii., fig. 70). *Legs*.—Reddish-brown, sturdy, moderately long, densely clothed with long black bristles and fine hairs, but displaying naked patches; tibiae, metatarsi, and tarsi i. and ii. armed with long and powerful spines; those on tibiae, metatarsi and tarsi iii. and iv. much less stronger than the foregoing; this is most marked in respect of leg iv.; claws long; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, sturdy, similar in colour, clothing and armature to leg i. *Falces*.—Moderately projecting, concolorous with cephalothorax, densely clothed with long, coarse hairs or bristles, but displaying naked areas; *rustellum* consists of three transverse rows of strong teeth; inner ridge of each falx armed with eight strong teeth and the outer with ten smaller ones; between these ridges there is an intermediate row consisting of four minute teeth; *fang* long, well curved, nearly black. *Maxillae*.—Reddish-yellow, arched, densely hairy, base obtusely acuminate; apex of inner angle terminating in a somewhat acuminate point; a few small spines present near the base. *Labium*.—Concolorous, arched, normal, hairy and furnished with a few small spines near the apex. *Sternum*.—Concolorous also, somewhat pyriform, clothed with long black bristles and hairs, and terminating obtusely between fourth pair of coxæ; *sigilla* marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, hairy, arched; superior surface chocolate-brown, irrorated with dull yellowish spots; sides and inferior surface much lighter in colour. *Spinnerets*.—Yellow, hairy, short, normal, inferior pair very short, and rather less than once their individual diameter apart.

Hab.—Eidsvold, Queensland.

Genus Tambouriniana, gen. nov.

Cephalothorax.—Obovate. *Pars cephalica* high (though not so much as in *Missulena*, Walck.), ascending; *ocular area* much broader than long. *Pars thoracica* widest at middle, retreating to posterior angle; *thoracic fovea* very deep and strongly procurved. *Eyes*.—Compactly grouped, distributed over two rows of four each; front row well procurved, the rear recurved behind, procurved in front. *Labium*.—Free, longer than broad, widest at base, apex slightly indented. *Sternum*.—Pyriform, broad; *sigilla* well marked, the first and second pairs marginal, the third well away from the margin. *Falces*.—Both ridges of each falx armed with teeth. *Spinnerets*.—As in *Arbanitis*, L. Koch.

TAMBOUBINIANA VARIABILIS, *sp. nov.*

(Pl. xiv., fig. 12; Pl. xxii., fig. 71.)

♀. Cephalothorax, 15.5 mm. long, 12.5 mm. broad; abdomen, 17.8 mm. long, 11.8 mm. broad (Pl. xiv., fig. 12).

Cephalothorax.—Obovate, reddish-brown, shining, uneven, sparingly clothed with long, fine, yellowish hairs. *Pars cephalica* high, arched, ascending, slightly depressed behind ocular tubercle, sides steep, compressed, segmental groove profound; *ocular area* broader than long, raised, arched, fringed in front with a cluster of stout bristles; *clypeus* hyaline, deep, sloping forward, undulated. *Pars thoracica* broad, arched, sharply retreating rearwards, posterior angle narrow, radial grooves distinct, lateral and posterior angles reflexed; *thoracic fovea* profound, deep, well procurved; *marginal band* moderately broad, yellow, fringed with long, black bristles. *Eyes*.—Compactly grouped, distributed over two rows of four each, front row strongly procurved, rear row procurved in front, recurved behind; anterior laterals largest of the group, elliptical, obliquely poised, ringed with black, close to edge of clypeus, and separated from each other by a space equal to about three times their individual diameter; median eyes round, each separated from its anterior lateral neighbour by a space equal to about once its own individual diameter, and again from each other by about the same distance; rear laterals elliptical, distinctly smaller than their anterior neighbours, obliquely poised, ringed with black; rear medians round, smallest of the group, widely separated, each very close to but not touching its lateral neighbour (Pl. xxii., fig. 71). *Legs*.—Moderately long, very strong, reddish-brown, well clothed with hairs and long coarse bristles, but displaying naked areas; tibiae, metatarsi and tarsi i., ii., and iii. armed with short, strong black spines; tibia iv. has five very weak spines; metatarsus and tarsus iv. are armed with short strong black spines; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, very strong, similar in colour and clothing to legs; tibia and tarsus armed with short powerful spines; tarsus scopulated. *Fulces*.—Projected forward, concolorous with cephalothorax, well clothed with short black hairs and stiff bristles, but displaying naked areas; inner angle of the furrow of each falx armed with eight strong teeth, and the outer with ten small ones; in addition to these there is between these two rows an intermediate series of ten minute teeth; *rustellum* consists of a large number of strong teeth distributed over an extensive area; *fang* long, shining, black. *Maxillæ*.—Reddish-brown, arched, well clothed with long coarse hairs, basal angle well excavated, terminating in an obtusely pointed heel, and furnished at its upper area with a rather dense cluster of spines; inner angle fringed with a reddish beard, and terminating obtusely at apex. *Labium*.—Free, concolorous, shining, arched, longer than broad, narrower at apex, which is gently indented, moderately clothed with bristles and furnished with a few small spines. *Sternum*.—Broadly pyriform, moderately arched, concolorous with labium, sparingly hairy, terminating obtusely between fourth pair of coxae; *sigilla* large, the first and second pairs marginal, and the third seated well away from margin. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, hairy,

yellow brown. *Spinnerets*.—Short, sturdy, dull yellow, hairy; first joint of superior pair as long as the second and third joints combined; third joint very small, dome-shaped; inferior spinners minute, and separated from each other by a space equal to once their individual diameter.

Hab.—Tambourine Mountain, and Eidsvold, Queensland.

TAMBOURINIANA VARIABILIS, var. FLAVOMACULATA, var. nov.

♀. Cephalothorax, 14.3 mm. long, 11.2 mm. broad; abdomen, 16.4 long, 14.8 mm. broad.

The example selected for the type of this variety agrees in every particular except size and abdominal ornamentation with the typical form. The *abdomen* is obovate, well arched, slightly overhanging base of cephalothorax, hairy, chocolate-brown, relieved on the superior surface by a series of eight large yellow patches, arranged in pairs below the last of which there are two transverse bars near the spinnerets; in addition to these, numerous yellow spots are present. In fact, the yellow markings are so prominent and distinctive that a varietal denomination appears necessary, and so it is named as above.

Obs.—Several specimens, all females, in various stages of development were obtained. The subspecies, *flavomaculata*, shows considerable variation both in abdominal ornamentation and size.

Hab.—Tambourine Mountain, Kedron Brook, Brisbane and Eidsvold, Queensland.

Genus Albaniana, gen. nov.

Cephalothorax.—Obovate. *Pars cephalica* raised, though not so much as in *Tambouriniana*, *gen. nov.*, arched, ascending, *ocular area* broader than long, raised. *Pars thoracica* broad, retreating; *thoracic fovea* deep, procurved. *Eyes*.—Distributed over two rows of four each; the two rows close together; anterior row procurved, rear row recurved. *Falces*.—Both ridges of the furrow of each falx armed with teeth. *Labium*.—Broader than long, free. *Sternum*.—Pyriform, broad; first and second pairs of *sigilla* marginal, the third away from margin. *Abdomen*.—Ovate. *Spinnerets*.—Short, but longer than in *Arbanitis* and *Tambouriniana*; superior pair extending beyond tip of abdomen.

ALBANIANA INORNATA, sp. nov.

(Pl. xxii., fig. 72.)

♀. Cephalothorax, 10.2 mm. long, 8.8 mm. broad; abdomen, 13.4 mm. long, 10 mm. broad.

Cephalothorax.—Obovate, uneven, yellow-brown, moderately clothed with fine yellowish hairs. *Pars cephalica* raised, ascending, arched, slightly depressed at rear of ocular tubercle, compressed laterally, segmental groove distinct; *ocular area* broader than long, raised, arched, black, and furnished in front with a tuft of stiff black bristles; *clypeus* hyaline, sloping forward, deep, indented at middle. *Pars thoracica* broad, arched, retreating gently towards posterior angle, radial grooves distinct;

thoracic fovea deep, well procurved; *marginal band* pallid, broad, undulating, fringed with fine yellowish hairs. *Eyes*.—Distributed over two rows of four each; the two rows close together; front row well procurved, the rear slightly procurved in front and also slightly recurved behind; anterior laterals largest of the group, elliptical, poised obliquely, and separated from each other by a space equal to three times their individual diameter; anterior medians considerably smaller, round, and separated from each other by a space equal to twice their own individual diameter; rear laterals rather smaller than their front lateral neighbours, elliptical, and poised obliquely; posterior medians widely separated, round, somewhat smaller than the anterior medians, close to, but not touching, their lateral neighbours (Pl. xx, fig. 72). *Legs*.—Moderately long, sturdy, concolorous with cephalothorax, densely hairy, but displaying naked areas, each ambulatory limb armed with short, stout spines, those on the two front pairs being much the strongest; metatarsi, and tarsi i. and ii. partially scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, very strong, similar in colour, clothing and armature to legs; tarsus partially scopulated. *Falces*.—Projected forward, concolorous with cephalothorax, well clothed with fine hairs and coarse bristles; inner ridge of the furrow of each falx armed with a row of nine strong teeth, and the outer with seven rather smaller ones; between these two rows there are at the base two or three minute teeth; *rastellum* consists of two transverse rows of rather strong teeth; *fang* black, shining, well curved. *Maxillæ*.—Reddish-brown, arched, hairy, basal angle excavated, furnished with a cluster of small spines, and terminating in an obtusely pointed heel; inner angle fringed with a beard of long, reddish hairs, and terminating at apex in an obtuse point. *Labium*.—Concolorous, free, well arched, shining, longer than broad, moderately clothed with long hairs, devoid of spines, apex gently rounded. *Sternum*.—Concolorous with labium, pyriform, broad, well arched, angles undulated, moderately clothed with stiff bristles, and terminating obtusely between fourth pair of coxæ; *sigilla* large, first and second pairs marginal, the third largest and away from margin. *Abdomen*.—Ovate, well arched, overhanging base of cephalothorax rather more than the majority of species, clay-yellow, hairy. *Spinnerets*.—Short, stout, yellowish, hairy, superior pair extending beyond tip of abdomen; of these the first joint is twice as long as that of the second, the third being very small and dome-shaped; inferior spinners very short, twice as long as broad, and quite close together—nearly touching.

Hab.—Albany Road, Narrogin, West Australia (May 22, 1912).

ALBANIANA ORNATA, *sp. nov.*

(Pl. xxii., figs. 73 and 74.)

♀. Cephalothorax, 8.8 mm. long, 7.4 mm. broad; abdomen, 11.5 mm. long, 8.2 mm. broad.

Cephalothorax.—Obovate, bright yellow, uneven, moderately clothed with rather long, fine, yellowish hairs. *Pars cephalica* well arched, ascending, truncated in front, furnished with a few black bristles at rear of ocular area, segmental groove distinct; *ocular area* much broader than long, black, raised, arched, and furnished in front with a tuft of black

bristles; *clypeus* hyaline, deep, sloping forward, undulated. *Pars thoracica* arched, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* pallid, undulated, fringed with long black hairs. *Eyes*.—Compactly grouped, distributed over two rows of four each; front row procurved, the rear slightly, procurved in front, and slightly recurved behind; anterior lateral eyes largest of the group, elliptical, obliquely poised, ringed with black, and separated from each other by a space equal to rather more than twice their individual diameter; front median eyes round, ringed with black, and separated from each other by a space equal to rather more than twice their individual diameter; rear laterals considerably smaller than their anterior neighbours, ringed with black and poised obliquely; rear medians smallest of the group, round, widely separated from each other, and each just touching its lateral neighbour; the two rows of eyes close together (Pl. xxii., fig. 73). *Legs*.—Moderately long, sturdy, concolorous with cephalothorax, hairy, but displaying naked areas; each ambulatory limb armed with strong, black spines; metatarsi and tarsi i. and ii. scopulated; scopulæ divided; relative lengths: 4, 1, 2, 3. *Palpi*.—Similar in colour, clothing and armature to legs i. and ii.; tarsal scopula divided. *Fulces*.—Projected well forward, strong, concolorous with cephalothorax, clothed with dark hairs and long, coarse bristles; inner angle of the furrow of each falx armed with seven strong teeth, and the outer with twelve small ones: in addition to these there is an intermediate row of three minute teeth; *rastellum* consists of two rows of long, strong teeth; *fang* dark brown, shining, well curved. *Maxillæ*.—Bright yellow, arched, hairy, heel well rounded, a cluster of small spines near the base, inner angle furnished with a beard of long, reddish hairs, and terminating at apex in a somewhat obtuse point. *Labium*.—Concolorous, rather longer than broad, arched, moderately hairy, a row of small spines near the apex, the latter very slightly concave. *Sternum*.—Pyriform, smoky yellow, hairy, terminating obtusely between fourth pair of coxæ; posterior *sigilla* away from margin. *Abdomen*.—Ovate, slightly overhanging base of cephalothorax, well arched, hairy; superior surface yellow, marked down the middle with a broad dull green longitudinal band, from which there extends laterally transverse bars in eschalon, these latter vary in different specimens (Pl. xxii., fig. 74); sides and inferior surface yellowish-green, hairy. *Spinnerets*.—Yellow, hairy, first joint twice as long as that of the second; third joint, minute, dome-shaped.

Hab.—Eidsvold, Queensland.

ALBANIANA VILLOSA, sp. nov.

(Pl. xxii., figs. 75.)

♀. Cephalothorax, 11.9 mm. long, 9 mm. broad; abdomen 10.8 mm. long, 7 mm. broad; abdomen shrivelled.

Cephalothorax.—Obovate, moderately clothed with long, fine yellowish hairs, shining, mahogany-brown, uneven. *Pars cephalica* high, ascending, well arched, compressed at sides, segmental groove distinct; *ocular area* broader than long, fringed in front with a cluster of stiff bristles; *clypeus* hyaline, sloping forward, undulated. *Pars thoracica* arched, broad at

middle, radial grooves distinct; *thoracic fovea* deep, very slightly procurved; *marginal band* broad, undulated, fringed with long fine hairs. *Eyes*.—Compactly grouped, distributed over two rows of four each; front row procurved, the rear slightly procurved in front, and distinctly recurved behind; side eyes of both rows elliptical, ringed with black, and poised obliquely; front anterior eyes almost touching edge of clypeus, not larger than their posterior lateral neighbours, and separated from each other by a space equal to fully that of three times their individual diameter; front medians round, ringed with black, and separated from each other by a space equal to about one-half their own individual diameter; lateral eyes of both rows close together and nearly touching; rear intermediate eyes small, rounded, widely separated, and each touching its lateral neighbour (Pl. xxii., fig. 75). *Legs*.—Concolorous with cephalothorax, moderately long, sturdy, densely hairy, but displaying naked areas; each ambulatory limb armed with long, strong, black spines; metatarsi and tarsi i. and ii. scopulated; scopula divided; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, sturdy, similar in colour, clothing and armature to legs i. and ii. *Falces*.—Projected well forward, concolorous with cephalothorax, shining, moderately clothed with fine hairs, and long, coarse bristles; inner angle of the furrow of each falx armed with six strong teeth, and the outer with ten smaller ones; in addition to these there is an irregular and intermediate row consisting of about a dozen minute teeth; *rastellum* consists of a number of strong teeth spread over a rather extensive area; *fang* long, well curved, nearly black. *Maxilla*.—Reddish-brown, long, arched, well rounded at heel, clothed with long, coarse hairs; the inner angle has a long reddish beard and a cluster of small spines near the base. *Labium*.—Concolorous, longer than broad, moderately clothed with long hairs, rounded at apex; there are also a few scattered spines. *Sternum*.—Broadly pyriform, yellowish, arched, clothed with long, coarse bristles; *sigilla* rather large, first and second pairs marginal, the third largest and away from margin. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, chocolate brown, densely clothed with long, coarse hairs. *Spinnerets*.—Yellowish, stout, hairy; first joint of superior pair longest, the third short and dome-shaped; inferior spinners short, cylindrical, rather more than once their individual diameter apart.

Hab.—Tambourine Mountain, Queensland.

ALBANIANA FLAVOMACULATA, *sp. nov.*

(Pl. xxii., fig. 76.)

♀. Cephalothorax, 8·9 mm. long, 7·5 mm. broad; abdomen, 11·2 mm. long, 7·5 mm. broad.

Cephalothorax.—Obovate, moderately pilose, yellow-brown. *Pars cephalica* high, ascending, well arched, compressed laterally, segmental groove distinct; *ocular area* much broader than long, nearly black, raised, arched, fringed in front with a tuft of black bristles; *clypeus* hyaline, broad, sloping well forward, deeply indented at middle. *Pars thoracica* broad, uneven, arched, retreating towards posterior angle, radial grooves broad, deep; *thoracic fovea* deep, well procurved; *marginal band* slightly

reflexed, pale yellowish, undulated, fringed with fine pale hairs. *Eyes*.—Distributed over two rows of four each; front row well procurved, the rear slightly procurved in front and slightly recurved behind; front lateral eyes elliptical, ringed with black, poised obliquely, and separated from each other by a space equal to fully three times their individual diameter; anterior intermediates round, small, and separated from each other by a space equal to rather more than once their own individual diameter; rear laterals as large as their anterior lateral neighbours, elliptical, poised obliquely, and ringed with black; rear intermediates widely separated, smallest of the group, but nearly as large as anterior intermediate eyes, slightly elliptical, ringed with black, each just touching outer ring of its lateral neighbour; both rows of eyes close together (Pl. xxii., fig. 76). *Legs*.—Rather short, sturdy, tapering, concolorous with cephalothorax, densely hairy, but displaying naked areas; legs i. and ii. armed with a series of powerful, black spines, and legs iii. and iv. with a series of very weak ones; metatarsus iii., however, has three strong spines at its apical extremity; metatarsi i. and ii. scopulated, the scopula divided; relative lengths: 4, 1, 2, 3. *Pulpi*.—Long, strong, similar in colour and clothing to legs; tibia and tarsus armed with numerous powerful, black spines; tarsal scopula divided. *Falces*.—Projected well forward, shining, rich mahogany brown, clothed with short, black hairs and coarse bristles, but displaying naked areas; inner angle of the furrow of each falx armed with six strong teeth; and the outer with eight small ones; there are also two or three minute intermediate teeth at the base; *rastellum* consists of three transverse rows of strong teeth; *fang* nearly black, shining, well curved. *Maxillæ*.—Yellow-brown, shining, hairy, arched, well rounded at heel, furnished with a few small spines at base of inner angle, the apex of which is obtusely pointed. *Labium*.—Concolorous, longer than broad, arched, somewhat coniform, no spines visible. *Sternum*.—Reddish-yellow, shining, arched, broadly pyriform, terminating obtusely between fourth pair of coxæ, clothed with coarse black bristles; posterior *sigilla* away from margin. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, moderately clothed with short fine hairs; superior surface yellow-brown ornamented with large yellow patches and small yellow spots; sides yellowish with faintly visible small, pale, somewhat elliptical markings; inferior surface yellow, hairy. *Spinnerets*.—Concolorous, hairy, the superior pair extending beyond tip of abdomen; of these, the basal joint is much the longest, the apical small and dome-shaped; inferior spinners short, rounded at apex, and separated from each other by a space equal to not more than once their individual transverse diameter.

Hab.—Albany Road, Narrogin (May 23, 1912), and Kalamunda, near Perth (May 16, 1912), West Australia; the latter immature.

Group EUOPLEÆ.

Genus Euoplos, Rainbow.

EUOPLOS SPINNIPES, Rainbow.

(Pl. xv., fig. 13; Pl. xvi., figs. 14 and 15.)

Euoplos spinnipis, Rainbow, Rec. Austr. Mus., x., 8, 1914, p. 219, figs. 28—31.

Hab.—Bidsvold, Queensland.

Group NEMESIÆ.

Amongst the material collected by Dr. Thos. Bancroft, at Eidsvold, Queensland, there is a very pretty male spider, which, whilst being a true Otenizid, differs from all Australian forms included in that series hitherto examined and studied by us. It has a rastellum and three claws, but like species of the genus *Rachias*, Sim. (Brazil), and *Scalidognathus*, Karsch (Ceylon), there is no tibial apophysis on leg i.; again, like *Hermacha*, Sim. (Central America and South Africa) the inferior tarsal claw is very rudimentary. It would seem, therefore, that a new genus is necessary for its reception. It may also be necessary hereafter to establish a new group for its convenience since it differs from all Nemesids in having the thoracic fovea straight instead of recurved. However, until such time as additional material, including male and female examples, shall have been collected, it will be better to include it in the Nemesiæ group. Accordingly it is there so placed.

Genus Bancroftiana,⁷ gen. nov.

Cephalothorax.—Obovate. *Pars cephalica* gently ascending; *ocular area* raised. *Pars thoracica* uneven, radial grooves distinct; *thoracic fovea* deep, straight. *Eyes*.—Eight, distributed over two rows of four each, the front row being procurved, and the rear recurved. *Legs*.—Long, tapering, not strong, spined; *tarsi* i. and ii. scopulated; superior claws long, armed with two rows of teeth; inferior claw rudimentary; no tibial apophysis on leg i. *Palpi*.—Tibial joint furnished with an apophysis; bulb bilobed, and terminated with a long pointed style. *Fulces*.—Armed with two rows of teeth, between which there is an intermediate series. *Labium*.—Short, broader than long. *Sternum*.—Shield-shaped; *sigilla* not very distinct, anterior pairs small and marginal, the posterior rather large, submarginal. *Spinnerets*.—Superior pair stout, basal joint much the longest, and the third minute and dome-shaped; inferior spinners very small.

BANCROFTIANA SPECIOSA, sp. nov.

(Pl. xxii., figs. 77 and 78.)

♂. *Cephalothorax*, 8 mm. long, 7 mm. broad; *abdomen*, 8·3 mm. long, 5·5 mm. broad.

Cephalothorax.—Obovate, sides rounded, orange-red with two lateral fuscous patches on cephalic segment, surface furnished with black bristly hairs. *Pars cephalica* ascending, moderately high, segmental groove distinct; *ocular area* raised, broader than long, black, fringed in front with a tuft of stiff bristles; *clypeus* broad, sloping forward, hyaline, indented at middle. *Pars thoracica* broad, uneven, radial grooves distinct; *thoracic fovea* deep, straight; *marginal band* yellowish, broad, undulated, fringed with short stiff black bristles. *Eyes*.—Distributed over two rows

⁷ In honour of the Collector.

of four each, the front procurved and the rear recurved; anterior medians round, largest of the group, and separated from each other by a space equal to about one-half their own individual diameter; anterior laterals larger than rear lateral eyes, elliptical, poised obliquely, each separated from its inner neighbour by a space nearly equal to that of one-half the individual diameter of one of the latter eyes; rear laterals also elliptical, and poised obliquely; rear medians very small, widely removed, each just touching the ring of its outer neighbour (Pl. xxii., fig. 77). *Legs*.—Concolorous with cephalothorax, long, not strong, tapering, hairy, but displaying naked areas, armed with numerous moderately strong black spines; tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, similar in colour and clothing to legs; tibia inflated and furnished with an apophysis, upon which there are a number of small black spines; bulb reddish, shining, bilobed, and terminating in an elongated, curved, slightly twisted, pointed style, the tip of which is barbed (Pl. xxii., fig. 78). *Falces*.—Concolorous with cephalothorax, narrow, not very strong, projected well forward, clothed with fine hairs and bristles, but displaying naked areas; *rastellum* consists of two transverse rows of moderately strong teeth; inner ridge of the furrow of each falx armed with a row of six large teeth, and one small one; outer ridge armed with a row of ten small teeth; between these two rows there is an intermediate series of eight minute teeth; the teeth upon the inner ridge are rather widely separated from each other; *fang* reddish-brown, shining, long, well curved. *Maxillæ*.—Yellowish, arched, hairy, slightly excavated at base, heel well rounded. *Labium*.—Short, broader than long, submerged, arched, concolorous with maxillæ, apex rounded and fringed with rather long, black bristles; there are also a few bristles distributed over the surface. *Sternum*.—Concolorous with labium, somewhat shield-shaped, narrowest in front, and broadest near the third pair of coxæ, arched, clothed with hairs and bristles, the marginal ones being much the longest and strongest; *sigilla* not distinct; first and second pairs very small, marginal; posterior pair rather large, round and submarginal. *Abdomen*.—Ovate, arched, slightly overhanging base of cephalothorax, hairy; superior surface yellow with a broad, longitudinal median band, and seven transverse bars of dark brown; inferior surface yellow. *Spinnerets*.—Short, yellow, hairy; superior pair stout, first joint longer than second and third combined, the latter minute and dome-shaped; inferior spinners very short, cylindrical, and separated from each other by a space equal to rather more than once their own individual transverse diameter.

Hab.—Eidsvold, Queensland.

Group CATAXEÆ.

In 1914, one of the writers of this paper^s proposed a new group to be known as Cataxeæ, for the reception of a species which, whilst possessing three claws and a rastellum, was devoid of tarsal scopulæ. The species thus described, *Cataxia maculata*, displayed, so far as its eye formula was

^s Rainbow—Rec. Austr. Mus., x., 8, 1914, p. 222.

concerned, an affinity to the genus *Aganippe*, L. Koch. The species described hereunder, which are also devoid of scopula, display an eye formula more in conformity with the *Arbanitesæ*, consequently a new genus is imperative for their reception and so we propose the following:—

Genus Armadalia, gen. nov.

Cephalothorax.—Obovate, arched. *Pars cephalica* ascending, moderately high; *ocular area* broader than long. *Pars thoracica* broad at middle; *thoracic fovea* deep, procurved. *Eyes*.—Distributed over two rows of four each, the front one being procurved, and the rear procurved in front and recurved behind; both rows close together. *Legs*.—Moderately long, strong; no scopula present; claws, three. *Falces*.—Projected, furnished with a *rastellum*; both ridges of the furrow of each falx armed with teeth. *Labium*.—Short, broad, free. *Sternum*.—Pyriform, broad, posterior *sigilla* away from margin. *Spinnerets*.—As in *Arbanitis*, L. Koch.

ARMADALIA ORNATA, sp. nov.

(Pl. xxii., fig. 79.)

♀. *Cephalothorax*, 9·2 mm. long, 7·6 mm. broad; abdomen, 10·5 mm. long, 7·6 mm. broad.

Cephalothorax.—Obovate, yellow, moderately hairy, and furnished with a few bristles. *Pars cephalica* moderately high, ascending, arched, slightly depressed at rear of *ocular area*, and slightly compressed laterally, *segmental groove* distinct; *ocular area* broader than long, raised, arched, black, furnished in front with a few short black bristles; *clypeus* hyaline, sloping forward, moderately deep, very gently undulated. *Pars thoracica* arched, retreating rearwards, radial grooves broad, deep; *thoracic fovea* slightly procurved; *marginal band* pale, undulated, reflexed, fringed with rather long fine hairs. *Eyes*.—Distributed over two rows of four each, the front one being procurved and the rear procurved in front and recurved behind; front lateral eyes largest of the group, two-and-a-half times their individual diameter apart, elliptical, poised obliquely, and mounted upon black rings; front medians round, and separated from each other by a space equal to about one-half their own individual diameter; rear laterals smaller than their anterior lateral neighbours, elliptical, poised obliquely, ringed with black; posterior intermediate eyes minute, round, widely separated, each just touching the outer ring of its lateral neighbour; both rows close together (Pl. xxii., fig. 79). *Legs*.—Short, sturdy, concolorous with cephalothorax, hairy, but displaying naked areas; legs i. and ii. armed with long, strong black spines, and legs iii. and iv. with long weak spines; scopula absent from all legs; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour and clothing to legs, and armed with long, powerful black spines; tarsal scopula absent. *Falces*.—Orange-red, projected, clothed with fine black hairs and long coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with six strong teeth, and the outer with ten smaller ones; between these two rows there is an intermediate series of four minute teeth; *rastellum* consists of a series of teeth spread over a

somewhat extensive area; *fung* long, dark brown, shining, well curved. *Maxillæ*.—Yellow, hairy, arched, heel well rounded; at lower portion of inner angle there is a cluster of small spines; apex of inner angle acuminate. *Labium*.—Concolorous, longer than broad, slightly widest at base, free, moderately clothed with rather coarse bristles. *Sternum*.—Pyriform, broad, arched, yellow, clothed with short, black hairs, and laterally with long coarse bristles, and terminating obliquely between fourth pair of coxæ; posterior *sigilla* away from margin, and seated at a point in a line midway between coxæ ii. and iii. *Abdomen*.—Obovate, arched, moderately projecting over base of cephalothorax, clothed with fine yellowish hairs; superior surface yellow, marked longitudinally and laterally with broad, chocolate brown bars; the longitudinal bar terminates midway, and the six transverse bars are recurved; between the bars there are a number of small brown spots; sides yellow; inferior surface concolorous, hairy. *Spinnerets*.—Yellow, hairy; superior pair extending slightly beyond tip of abdomen, their first joint longest, and their third minute and dome-shaped; inferior spinners small, coniform, and separated from each other by a space equal to once their own individual diameter.

Hab.—Eidsvold, Queensland.

ARMADALIA SEIOSA, *sp. nov.*

(Pl. xv., fig. 16, and Pl. xxii., fig. 80.)

♀. Cephalothorax, 5.5 mm. long, 4.5 mm. broad; abdomen, 7.1 mm. long, 5.5 mm. broad (Pl. xv., fig. 16).

Cephalothorax.—Obovate, yellow, moderately clothed with fine yellowish hairs. *Pars cephalica* moderately high, ascending, arched, segmental groove distinct; *ocular area* broader than long, black, raised, arched, fringed in front with a small tuft of bristles; *clypeus* hyaline, sloping forward, indented at middle. *Pars thoracica* broad, retreating rearwards, radial grooves rather deep; *thoracic fovea* deep, slightly procurved; *marginal band* pallid, undulated, fringed with short, fine, pale hairs. *Eyes*.—Distributed over two rows of four each, the front one being procurved and the rear recurved behind and procurved in front; front lateral eyes about three times their individual diameter apart; intermediate pair as large as their lateral neighbours, and separated from each other by about one half their own individual diameter; rear lateral eyes slightly smaller than their anterior neighbours, elliptical, poised obliquely, and ringed with black; rear medians smallest of the group, widely separated, each one touching its lateral neighbour; both rows close together (Pl. xxii., fig. 80). *Legs*.—Short, sturdy, concolorous with cephalothorax, clothed with short black hairs, and erect setæ, but displaying naked areas; setæ most numerous on legs iii. and iv.; legs i. and ii. armed with short, powerful spines, and legs iii. and iv. with weak ones; *metatarsi* iii. armed on upper surface with three short, strong spines; relative lengths: 4, 1, 2, 3. *Palpi*.—Similar in colour and clothing to legs, and armed with numerous short, powerful spines. *Fulces*.—Projected, concolorous with cephalothorax, clothed with fine black hairs and coarse black

bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with six and the outer with eight strong teeth; *rastellum* consists of three rows of fairly strong teeth. *Maxilla*.—Yellow, hairy, heel well rounded, and furnished with a cluster of small spines at base of inner angle. *Labium*.—Concolorous, free, submerged, broader than long, slightly widest at base, arched, clothed with a few bristly hairs. *Sternum*.—Broad, pyriform, arched, pale yellow, moderately clothed with fine hairs and laterally with long, strong bristles, and terminating obtusely between fourth pair of coxae. *Abdomen*.—Obovate, arched, moderately hairy, slightly overhanging base of cephalothorax; superior surface dull, dark green, ornamented with a broad chocolate-brown longitudinal band and transverse bars; between the latter there are a number of small brown spots; longitudinal band terminates about midway; sides and inferior surface dull green, and hairy. *Spinnerets*.—Yellow, hairy; superior pair extended slightly beyond tip of abdomen, the first joint longest and the third shortest and dome-shaped; inferior spinners minute, and separated from each other by a space equal to once their individual transverse diameter.

Obs.—Very similar to foregoing in abdominal ornamentation, but easily distinguished therefrom by its smaller size, setose legs, and dentition of falces.

Hab.—Armadale, West Australia (March 26, 1912).

ARMADALIA ZORODES,⁹ *sp. nov.*

(Pl. xxii., fig. 81.)

♀. Cephalothorax, 6·7 mm. long, 5·3 mm. broad; abdomen, 10 mm. long, 7·4 mm. broad.

Cephalothorax.—Obovate, yellow-brown, shining, moderately hairy, arched. *Pars cephalica* ascending, sides compressed, declivous, furnished with a tuft of bristles in front of eyes, and a row of same running from rear of eyes to posterior extremity, segmental groove distinct; *ocular area* broader than long, raised, dark brown; *clypeus* broad, sloping forward, undulating, hyaline. *Pars thoracica* uneven, retreating, radial grooves broad; *thoracic fovea* deep, procurved; *marginal band* undulating, hyaline, fringed with fine hairs. *Eyes*.—Compactly grouped, distributed over two rows of four each; front row procurved, the rear recurved behind and procurved in front; front side eyes somewhat the largest of the group, elliptical and poised obliquely; anterior medians round, separated from each other by a space equal to about one-half their own individual diameter, and each again from its lateral neighbour by a similar space; rear laterals elliptical, and poised obliquely; posterior medians widely separated, small, each just touching its lateral neighbour; both rows of eyes close together (Pl. xxii., fig. 81). *Legs*.—Concolorous with cephalothorax, strong, hairy, but displaying naked areas; tibia, metatarsus and tarsus i. and ii. armed with strong short spines; those on legs iii. and iv. less

⁹ ξωρωδης=unmarked.

numerous and not so strong; relative lengths: 4, 1, 2, 3. *Palpi*.—Concolorous with legs, strong, moderately long, similar to legs i. and ii. in armature and clothing. *Falces*.—Concolorous with cephalothorax, shining, arched, moderately projected, clothed with fine hairs and coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with six strong teeth, and the outer with a row of eight small teeth, the latter placed closely together; *fang* dark brown, shining, long, well curved. *Maxillæ*.—Yellow, hairy, heel well rounded; near excavated angle there is a cluster of small dark spines; beard yellowish. *Labium*.—Concolorous, short, free, slightly longer than broad, arched, furnished with a few short stiff bristles, apex rounded. *Sternum*.—Concolorous also, shield-shaped, slightly arched, widest near third pair of coxæ, thinly clothed with stiff black bristles; posterior *sigilla* large, and away from margin. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, clay yellow, clothed with fine hairs and long black bristles or setæ. *Spinnerets*.—Concolorous, hairy; superior pair short, stout, tapering, first joint longest, the third shortest; inferior spinners cylindrical, fully twice their own individual transverse diameter apart.

Hab.—Mount Lofty, South Australia.

ARMADALIA PALLIDA, *sp. nov.*

(Pl. xxiii., fig. 82.)

♀. Cephalothorax, 10.5 mm. long, 7.6 mm. broad; abdomen, 14.1 mm. long, 9.4 mm. broad.

Cephalothorax.—Obovate, yellow, arched, moderately clothed with fine yellow, downy hairs. *Pars cephalica* high, ascending, sides compressed, marginal groove distinct, a row of stiff bristles or setæ runs down the middle from rear of eye space to base of cephalic segment, there is also a tuft of stiff bristles in front of the eyes; *ocular area* broader than long, slightly raised, front median eyes surrounded by black, there are also two small black lateral bands, each of which lies between and connects the rings upon which the side eyes are poised; *clypeus* deep, sloping, indented at middle, hyaline. *Pars thoracica* uneven, retreating, radial grooves deep; *thoracic fovea* deep, moderately procurved. *Eyes*.—Distributed over two rows of four each, the front row being procurved, and the rear recurved; front lateral eyes just touching edge of clypeus, largest of the group, elliptical, poised obliquely, and separated from each other by a space equal to that of two-and-a-half times their own individual diameter; anterior medians round, and separated from each other by one-half that of their own individual diameter; rear side eyes elliptical, obliquely poised, smaller than their front lateral neighbours, from which they are separated by a space equal to that of once their own individual diameter; rear intermediates minute, each just touching the outer edge of the ring of its lateral neighbour (Pl. xxiii., fig. 82). *Legs*.—Concolorous with cephalothorax, strong, moderately long, hairy, but displaying naked areas; each tibia, metatarsus and tarsus armed with powerful spines; relative lengths: 4, 1, 2, 3. *Palpi*.—Rather long, strong, similar in colour, clothing and armature to legs. *Falces*.—Slightly darker than cephalothorax, projected well forward, clothed with fine hairs and coarse bristles,

but displaying naked areas; inner ridge of the furrow of each *falx* armed with six strong teeth, and the outer with eight small ones; in addition to these there is an intermediate row of nine minute ones, the row terminating near base of fang; *rastellum* consists of three transverse rows of strong teeth; *fang* reddish brown, strong, well curved. *Maxillae*.—Yellow, arched, hairy, excavated at base, heel obtuse, inner angle bearded with long yellow hairs and terminating apically in an obtuse point; a few small spines near the base. *Labium*.—Concolorous, free, slightly submerged, short, broad, well arched, apex fringed with long black bristles; a few of the latter are also spread over the surface. *Sternum*.—Concolorous also, shield-shaped, arched, clothed with long black bristles; first and second pairs of *sigilla* marginal, posterior pair large, submarginal. *Abdomen*.—Ovate, arched, very slightly projecting over base of cephalothorax, yellow, clothed with fine yellowish down, and, on its superior surface, with rather long setæ. [The latter had become detached from the animal when placed in the tube in which it was preserved.] *Spinnerets*.—Short, yellow, hairy; superior pair stout, first joint longest, the third minute and dome-shaped; inferior spinners very short, and twice their own diameter apart; *colulus* well developed.

Obs.—Collector's [R.H.P.] fieldnote reads: "Hard-lid trapdoor."

Hab.—Eidsvold, Queensland.

Genus Cataxia, Rainbow.

The following species belongs to the above genus¹⁰ which it seems advisable to amend in so far as the *labium* and *sternum* are concerned, so as to read as follows:—

Labium.—Short, broad, arched, bespined at apex. *Sternum*.—Shield-shaped, arched, first and second pairs of *sigilla*, when present, very small, marginal; posterior *sigilla* submarginal, large.

CATAXIA TETRICA, *sp. nov.*

(Pl. xxiii., fig. 83.)

♀. Cephalothorax 10.9 mm. long, 7.1 mm. broad; abdomen 11.7 mm. long, 12.5 mm. broad.

Cephalothorax.—Obovate, yellow, arched, sparingly pubescent. *Pars cephalica* ascending, sides compressed, segmental groove distinct; *ocular area* broader than long, furnished in front with a tuft of stiff bristles; *clypeus* broad, hyaline, sloping forward, deeply indented at middle. *Pars thoracica* uneven, retreating, radial grooves broad and distinct; *thoracic fovea* deep, straight; *marginal band* broad, undulating, fringed with fine black hairs. *Eyes*.—Distributed over two rows of four each, the front one being strongly procurved, and the rear equally strongly recurved; front lateral eyes elliptical, obliquely poised, fully three times their own individual diameter apart; front median eyes round, and once their own individual diameter apart; rear lateral eyes largest of the group, elliptical

¹⁰ Rainbow.—Rec. Austr. Mus., x., 8, 1914, p. 223.

and poised obliquely; rear medians small, widely separated, each just touching the ring of its lateral neighbour (Pl. xxiii., fig. 83). *Legs*.—Moderately long, strong, concolorous with cephalothorax, hairy, but displaying naked areas, each well armed with black spines, of which those on legs i. and ii. are not only the most powerful but the most numerous; claws long and similar to those of *U. maculata*,¹¹ Rainbow; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, strong, similar in colour, clothing and armature to legs i. and ii. *Falces*.—Concolorous with cephalothorax, strong, projecting, clothed with fine hairs and long, coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with a row of seven strong teeth, and the outer with a row of nine small ones; between these there is an intermediate row of six minute teeth; *rastellum* consists of two rows of strong spines; *fang* long, shining, almost black, well curved. *Maxillæ*.—Yellow-brown, shining, powerful, arched, hairy, base excavated, heel well rounded and furnished with a few small spines at inner angle. *Labium*.—Rather longer than broad, but short, free, well arched, moderately hairy, three rows of small spines near apex, the latter fringed with stiff bristles. *Sternum*.—Shield-shaped, yellow, well arched, clothed with stiff bristly hairs, widest between third pair of coxæ; posterior *sigilla* large, submarginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, clothed with short hairs, yellow brown with a number of small yellow spots scattered over superior surface. *Spinnerets*.—Yellow, hairy, stout; superior pair have the basal joint longest, and the third shortest and dome-shaped; inferior pair very short, and twice their own individual transverse diameter apart.

Hab.—Eidsvold, Queensland.

Subfamily BARYCHELINÆ.

Group DIPLOTHELÆ.

With this paper the student is introduced to a new group for Australia—the Diplotheleæ, of which, up to the present, three genera only have been known, namely *Acropholius*, Simon, *Vestrotrema*, Simon, and *Diplothele*, O. P. Cambr. Of these the two first named hail from Madagascar, and the other from India and Ceylon. The eye formula of all three genera, and the one we now know to occur in Australia show close affinity. The points upon which the group is distinguished are:—Spinnerets, usually two only; labium broader than long. Specimens known to the writers come from Henley (Adelaide), Black Hill (Mount Lofty Ranges), and Mallala, South Australia, and from Eidsvold, Queensland.

An interesting feature in connection with our Australian form, for which the name *Lampropodus scintillans* is proposed, is that the heavy tarsal brushes on all the feet of both sexes are brilliantly iridescent, especially when viewed by the aid of a strong light, bright green, fiery red and opalescent tints predominating. If the same feature obtains in exotic species, the fact has not been recorded. Another example was sent

¹¹ Rainbow.—*Loc. cit.*, p. 224, fig. 34.

by Dr. T. Bancroft from Eidsvold, Queensland. It is a distinct species from those collected around Adelaide and although the feet scintillate in a like manner with the South Australian form, they are not so heavily padded.

The foreign genera enumerated above embrace five distinct species, our Australian representatives make seven.

Genus Lampropodus,¹² *gen. nov.*

♂. *Cephalothorax*.—Obovate, narrow and truncated in front, broad at the middle. *Pars cephalica* slightly raised, arched, gently ascending, segmental groove distinct; *ocular tubercle* high, arched, rather longer than broad; *clypeus* narrow, steep. *Pars thoracica* broad, radial grooves distinct; *thoracic fovea* very slightly procurved. *Eyes*.—Distributed over three rows of 2, 2, 4 each; the rear row procurved in front, straight behind. *Legs*.—Long; tibia i. furnished with an apophysis; metatarsi and tarsi scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Tibial joint scopulated. *Fulces*.—Short, not strong, moderately projected; inner ridge only of the furrow of each falx dentated. *Labium*.—Much broader than long, free; apex very slightly excavated. *Sternum*.—Pyriform, broad; *sigilla* minute, marginal. *Spinnerets*.—Stout, short, first and second joints of equal lengths; inferior spinners atrophied or absent; *anal tubercle* large.

♀. Allowing for sexual differences, similar to the male; the legs and anal tubercle are decidedly shorter, and the palpi much longer; two spinners only.

LAMPROPODUS SCINTILLANS, *sp. nov.*

(Pl. xvii., figs. 17, 18, 19 and 20, Pl. xviii., figs. 21 and 22, and Pl. xxiii., figs. 84 and 85.)

♂. *Cephalothorax*, 9.2 mm. long, 8.9 mm. broad; abdomen, 8.7 mm. long, 7.4 mm. broad (Pl. xvii., figs. 17 and 18).

Cephalothorax.—Obovate, narrowest in front, dark brown, densely matted with long, hoary silken hairs. *Pars cephalica* arched, gently ascending, segmental groove distinct; *ocular tubercle* longer than broad, high, arched, black; *clypeus* narrow, steep. *Pars thoracica* broad, arched, radial grooves moderately deep; *thoracic fovea* very slightly procurved; *marginal band* broad. *Eyes*.—Distributed over three rows of 2, 2, 4; anterior pair slightly elliptical, poised obliquely, and separated from each other by a space scarcely equal to that of once their individual diameter; second, or intermediate pair, larger than the foregoing, round, and separated from each other by a space equal to that of once their own individual diameter; posterior laterals scarcely as large as the anterior eyes, elliptical, poised obliquely, and slightly excavated on their inner angle; rear intermediates smallest of the group, elliptical, widely

¹² λαμπρος, shining; ποδος, foot; =shining foot.

separated, each touching its lateral neighbour; the rear row of eyes quite close to the second or intermediate pair, procurved in front, straight behind (Pl. xxiii., fig. 84). *Legs*.—Concolorous with cephalothorax, long, densely hairy, and armed on all joints with long, fine spines; metatarsi and tarsi scopulated; tibia i. furnished with an apophysis; scopulæ and tarsal pads scintillating, the pads divided; relative lengths: 4, 1, 2, 3. *Palpi*.—Short, similar in colour and clothing to legs; tarsal joint short, scopulated; bulb, orange-red, shining, bilobed, pyriform; stigma short, twisted and terminating in a very short style (Pl. xxiii., fig. 85). *Falces*.—Short, not strong, slightly projected, densely hairy, and displaying no naked areas; inner ridge of the furrow of each falx armed with a row of six strong teeth. *Maxilla*.—Red, shining, hairy, heel well rounded, inner angle thickly bearded with red hairs, and terminating obtusely at apex. *Labium*.—Concolorous, broader than long, free, moderately hairy, arched, apex gently excavated and fringed with coarse bristles. *Sternum*.—Slightly darker than foregoing, broad, somewhat pyriform, flat, hairy; *sigilla* minute, marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, dark brown, densely clothed with long hairs; *anal tubercle* large, extending nearly to apices of spinners. *Spinnerets*.—Concolorous, short, stout, first and second joints of equal lengths, the third minute, dome-shaped.

♀. Cephalothorax, 9.5 mm. long, 8.5 mm. broad; abdomen, 12.6 mm. long, 9.2 mm. broad (Pl. xvii., figs. 19 and 20).

Cephalothorax.—Obovate, dark brown, thickly clothed with moderately long silky yellowish hairs; the latter are not nearly as long or so thickly matted as in the male. *Pars cephalica* gently ascending, truncated in front, segmental groove distinct; *ocular tubercle* high, well arched, black, furnished in front with a small tuft of short, black bristles; *clypeus* as in the male. *Pars thoracica* broad, radial grooves distinct; *thoracic fovea* very slightly procurved; marginal band fringed with rather long hairs. *Eyes*.—Similar to those of the male. *Legs*.—Moderately long, concolorous with cephalothorax, thickly clothed with grey hairs, amongst which are a number of long, black bristles; each ambulatory limb armed with long, fine black spines; metatarsi and tarsi thickly scopulated; scopulæ and tarsal pads iridescent; relative lengths: 4, 1, 2, 3. *Palpi*.—Long, similar in colour, clothing and armature to legs. *Falces*.—Concolorous with cephalothorax, similar in clothing and armature to male. *Maxilla*.—Dark brown, shining, heel rounded, inner angle fringed with a beard of long, bright red hairs. *Labium*.—Concolorous; similar to male. *Sternum*.—Concolorous also, broad, flat, moderately hairy, terminating obtusely between fourth pair of coxæ; *sigilla* minute, marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, dark brown, thickly clothed with fine short hairs; two muscle spots just visible near anterior extremity; *anal tubercle* well developed, but shorter than in the male. *Spinnerets*.—Two only, concolorous, short, stout, hairy; first and second joints of equal lengths, the third minute.

Hab.—Henley Beach, Adelaide; Black Hill, Mount Lofty Ranges (November 18th, 1917); and Mallala, South Australia.

LAMPROPODUS IRIDESCENS, *sp. nov.*

(Pl. xix., figs. 23 and 24, and Pl. xxiii., figs. 86 and 87.)

♂. Cephalothorax, 9.6 mm. long, 8.7 mm. broad; abdomen, 9.4 mm. long, 7.1 mm. broad (Pl. xxiii., figs. 23 and 24).

Cephalothorax.—Obovate, narrowest in front, dark brown, moderately clothed with long dark hairs. *Pars cephalica* arched, gently ascending, segmental groove distinct; *ocular area* raised, arched, longer than broad; *clypeus* narrow, steep, hyaline. *Pars thoracica* broad, arched, radial grooves distinct; *thoracic fovea* very slightly procurved; *marginal band* broad. *Eyes*.—Distributed over three rows of 2, 2, 4 each; anterior pair touching edge of clypeus, large, separated from each other by a space equal to once their individual diameter; intermediate pair of equal size to foregoing, and separated from each other by a space equal to rather more than one-half their individual diameter; posterior laterals elliptical, poised obliquely, and distinctly smaller than their anterior neighbours; rear medians smallest of the group, widely separated from each other, elliptical, each touching its lateral neighbour; the rear row of eyes is quite close to the second or intermediate pair, procurved in front and straight behind (Pl. xxiii., fig. 86). *Legs*.—Long, hairy, dark brown, tapering, and armed with rather short fine spines; first and second pairs stout; tibia i. furnished with a prominent apophysis, at the apex of which there is a stout, stiff spine; metatarsi and tarsi scopulated; scopulae when viewed by the aid of a bright light display iridescent reflections; tarsal pads not divided; relative lengths: 4, 1-2, 3. *Palpi*.—Short, similar in colour and clothing to legs, tarsal joint scopulated; bulb pyriform, shining, reddish, twisted at penultimate extremity, and terminating in a short style (Pl. xxiii., fig. 87). *Falces*.—Short, concolorous with cephalothorax, slightly projected, not strong, densely hairy, and displaying no naked areas; inner angle of the furrow of each falx armed with a row of eight strong teeth; beard long, red. *Maxille*.—Brown, hairy, heel well rounded, inner angle bearded with long red hairs, and terminating obtusely at apical extremity. *Labium*.—Concolorous, short, broader than long, free, arched, apex very slightly excavated, and fringed with coarse bristles. *Sternum*.—Chocolate brown, somewhat pyriform, flat, hairy, and terminating in an acute point between fourth pair of coxae; *sigilla* minute, marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, hairy, dark brown. *Spinnerets*.—Superior pair yellowish, short, stout, hairy, first joint longest, the third minute and dome-shaped; inferior pair close together, exceedingly minute, and hidden amidst the dense hairy clothing.

Obs.—One specimen only and that collected by Dr. T. Bancroft. *L. iridescens* is easily distinguished from *L. scintillans* by the clothing of the cephalothorax, the palpal bulb, and the dental armature of the falces. In *scintillans* the cephalothorax is strikingly hoary, the bulb bilobed, and the inner margin of the furrow of each falx armed with six strong teeth, whilst in *iridescens* the cephalothorax is dark brown and very much less densely clothed; the bulb is not bilobed, and the inner margin of the furrow of each falx is armed with eight strong teeth.

Hab.—Eidsvold, Queensland.

Group BARYCHELEÆ.

Genus *Encyocrypta*, Sim.

ENCYOCRYPTA FUSCA, L. Koch.

Idiommatu fusca, L. Koch, Die Arach. des Austr., i., 1873, p. 478, pl. xxxvii., figs. 1, 1a, 1b.

Encyocrypta fusca, Hogg, Proc. Zool. Soc., 1901, p. 241; Rainbow, Rec. Austr. Mus., x., 8, 1914, p. 226, figs. 36-39.

Obs.—An immature example; collected by Dr. T. Bancroft.

Hab.—Eidsvold, Queensland.

Genus *Idioctis*, L. Koch.

IDIOCTIS PALMARUM, Hogg.

Idioctis palmarum, Hogg, Proc. Zool. Soc., 1901, p. 242, figs. 26a and c.

Hab.—Palm Creek, Central Australia.

Subfamily AVICULARINÆ.

Group SELENOCOSMIEÆ.

Genus *Selenocosmia*, Auss.

SELENOCOSMIA STIRLINGI, Hogg.

Selenocosmia stirlingi, Hogg, Proc. Zool. Soc., 1901, p. 245, fig. 27.

Obs.—The specimens from Mallala are immature; those from Pichi Richi are fully grown.

Hab.—Mallala, and Pichi Richi, South Australia.

SELENOCOSMIA CRASSIPES, L. Koch.

Phrictus crassipes, L. Koch, Die Arach. des Austr., i., 1874, p. 490, pl. xxxvii., figs. 5, 5a.

Phlogius crassipes, Sim., Bull. Soc. Ent. France (6), vii., 1887; Hist. Nat. des Araign., i., 1892, p. 146.

Phrictus crassipes, Spencer, Rep. Horn. Expl. Exped., ii., Zoology, 1896, p. 412, pl. 28; Rainbow, Rec. Austr. Mus., iv., 1, 1901, p. 11.

Selenocosmia crassipes, Hogg, Proc. Zool. Soc., 1901, p. 245.

Hab.—Mallala, South Australia.

Genus *Selenotypus*, Pocock.

SELENOTYPUS PLUMIPES, Pocock.

Selenotypus plumipes, Pocock, Ann. Mag. Nat. Hist. (6), 1895, p. 176, pl. x., figs. 2, 2a, 2b; Hogg, Proc. Zool. Soc., 1901, p. 249, fig. 29.

Obs.—This is our largest Australian spider. The specimen before the writers was collected by Dr. McGillivray.

Hub.—Clandie River, Cape York, North Queensland.

Subfamily DIPLURINÆ.

Group DIPLURINÆ.

Genus *Anane*, L. Koch.

This genus was sunk by Simon¹³ as a synonym of *Brachythele*, Auss., but was afterward rehabilitated by Hogg.¹⁴ Later, Simon, in the supplement to his great work,¹⁵ accepted the decision of Hogg, and concurred in the re-establishment of L. Koch's genus. The confusion of *Anane* and *Brachythele* was due to the incomplete definition of the former by its author. Up to the present time seven species have been recorded to the genus, and to these sixteen additional forms are now made known. Of the seven previously recorded, however, one, *A. bicolor*,¹⁶ Rainbow, must be transferred to the genus *Atrac*, O. P. Cambr., to which, by its scheme of dentition it certainly belongs. In *Anane* one ridge only of the furrow of each palpus is provided with teeth, whereas in what must now be known as *Atrac bicolor*, both ridges are dentated.

Two males are included in the species described hereunder, and neither of them are provided with an apophysis. The absence of this is, of course, a generic character. For the guidance of students the following table is appended. In respect of Hogg's species, neither of which are included in our collection, the features noted have been adopted from that author's original description.

- | | |
|--|------------------------------|
| Front median eyes one half their own individual diameter apart; abdomen yellow with black median and lateral stripes | <i>A. pallida</i> , L. Koch. |
| Front median eyes three quarters their own individual diameter apart; front and rear side eyes equal in size and almost contiguous; abdomen black above and mottled with irregular yellow spots..... | <i>A. grisea</i> , Hogg. |
| Front median eyes one-and-a-half their individual diameter apart; superior surface of abdomen black with a longitudinal bar and lateral stripes, the latter forming an inverted eschelon pattern; bar and stripes composed of irregular yellow spots. | <i>A. arborea</i> , Hogg. |
| Front median eyes twice their own individual diameter apart; superior surface of abdomen black with five yellow lateral stripes..... | <i>A. pellucida</i> , Hogg. |
| Front median eyes three-quarters their own individual diameter apart; abdomen dingy yellow, with short, fine, downlying, yellow hair interspersed on upper side with long, thin, upstanding bristles.... | <i>A. tasmanica</i> , Hogg. |
| Front median eyes one-half their own individual diameter apart, heel of each maxilla well rounded, devoid of spines; abdomen dark brown, densely clothed with long hairs..... | <i>A. minor</i> , Kulcz. |

¹³ Simon.—Hist. Nat. des Araign., i., 1902, p. 180.

¹⁴ Hogg.—Proc. Zool. Soc., 1901, p. 251.

¹⁵ Simon.—Op. cit., ii., 1897 (1903), p. 965.

¹⁶ Rainbow.—Rec. Austr. Mus., x., 8, 1914, p. 233.

- Eyes of front row very close to each other, and also to edge of clypeus; heel of each maxilla thickly studded with spines; abdomen chocolate-brown, densely clothed with long hairs.....*A. villosa*, sp. nov.
- Front median eyes rather more than one half their own individual diameter apart; heel of each maxilla densely studded with spines; abdomen chocolate-brown, clothed with grey silky hairs.....*A. hirsuta*, sp. nov.
- Front median eyes rather smaller than their lateral neighbours, and separated from each other by a space equal to that of one-half their own individual diameter; heel of each maxilla thickly studded with spines; abdomen dark brown, densely hairy.....*A. comosa*, sp. nov.
- Front median eyes once their own individual diameter apart; heel of each maxilla thickly studded with spines; abdomen yellow-brown with a dark brown median area extending, on its superior surface, from anterior extremity towards spinnerets.....*A. grandis*, sp. nov.
- Front median eyes half their own individual diameter apart; heel of each maxilla thickly studded with spines; the entire body yellow.....*A. aurea*, sp. nov.
- Front median eyes half their own individual diameter apart; heel of each maxilla thickly studded with spines; superior surface and sides of abdomen brown, spotted with yellow, densely clothed with yellowish pile and furnished at anterior extremity with a number of short black bristles.....*A. flavomaculata*, sp. nov.
- Space in both sexes between each eye of front row less than one-half the individual diameter of one of the anterior median eyes; bulb of σ palpus yellow, pyriform, twisted and terminating in a short blunt style; a small cluster of spines near heel of each maxilla (σ); two or three small spines near apex of labium; abdomen densely clothed with long hairs; yellow with undefined smoky areas. φ : Maxilla and labium as in σ ; abdomen yellow mottled with chocolate brown, the latter forming a moderately well defined median design with lateral markings.....*A. nebulosa*, sp. nov.
- Front median eyes once their own individual diameter apart; a cluster of small spines at excavated angle of each maxilla; three small spines on labium; superior surface of abdomen yellow with brown spots and median and lateral markings, the latter broken and forming a rather ill-defined pattern.....*A. decora*, sp. nov.
- Front median eyes one-half their own individual diameter apart; inner angle of each falx armed with moderately long black spines similar to those on legs; base of maxillæ studded with spines; three small spines on labium; superior surface of abdomen yellow, mottled with dark brown, but displaying no design.....*A. armigera*, sp. nov.
- Front median eyes three-quarters their own individual diameter apart; each maxilla densely bespined at base; superior surface of abdomen dark brown mottled with pale yellow spots.....*A. maculata*, sp. nov.
- Front median eyes one-half their own individual diameter apart; cephalothorax yellow-brown, margined with dark brown; heel of each maxilla thickly studded with small spines; abdomen densely clothed with long hairs, the superior surface dark brown, and the sides yellow-brown.....*A. fuscocincta*, sp. nov.
- Front median eyes about one-half their own individual diameter apart; heel of each maxilla furnished with a few small spines; superior surface and sides of abdomen dark brown, mottled with dull yellow spots.....*A. canosa*, sp. nov.
- Front median eyes one-third their own individual diameter apart; bulb of σ palpus dark brown, pyriform, bilobed, and terminating in a moderately long, pointed style; abdomen densely clothed with long hairs; superior surface dark brown with an interrupted median longitudinal yellow band, and transverse concolorous bars.....*A. pulchra*, sp. nov.

Front median eyes three-quarters their own individual diameter apart; heel of each maxilla studded with a dense cluster of small spines; abdomen dark brown, densely clothed with long hairs *A. robusta*, sp. nov.

Front median eyes once their own individual diameter apart; each maxilla furnished with a few small spines at base of inner angle; two or three small spines present on labium; superior surface of abdomen in typical form yellow, mottled with brown spots and patches, both of which form a confused design; in *var. a* the abdomen is densely clothed with long hairs, and the superior surface is dark brown with one large yellow spot near anterior extremity; in addition to this there is a number of small and obscure yellow spots *A. confusa*, sp. nov.

Eyes of front row close together, the laterals being slightly the largest of the group; anterior and posterior side eyes touching; maxillæ studded with spines; superior surface of abdomen dark brown, intricately mottled with yellow *A. intricata*, sp. nov.

Eyes of front row separated from each other by a space equal to that of one-half the individual diameter of one of the median pair; anterior and posterior side eyes touching; each maxilla furnished at base with a cluster of small spines, and the labium near apex with three or four; superior surface of abdomen dark brown, spotted with yellow *A. butleri*, sp. nov.

ANAME MINOR, Kulcz.

Aname minor, Kulcz., Ann. Mus. Nat. Hung., vi., 1908, p. 456.

Hub.—Mount Victoria, New South Wales.

ANAME ? PALLIDA, L. Koch.

Aname pallida, L. Koch, Die Arach. des Austr., i., 1873, p. 465, pl. xxxv., figs. 8 and 8a; Hogg, Proc. Zool. Soc., 1901, p. 252; Rainbow, Rec. Austr. Mus., x., 8, 1914, p. 222.

Obs.—Several female examples in different stages of development, of what is probably L. Koch's species. Hogg (*supra*), in a note upon *A. pallida* says:—"The dark median and side stripes on abdomen, and front middle eyes only one-half a diameter apart serve to distinguish it." The points here quoted are borne out in the examples before us.

Hub.—Eidagold, Queensland.

ANAME VILLOSA, sp. nov.

(Pl. xxiii., fig. 88.)

♀. Cephalothorax, 10.7 mm. long, 8.7 mm. broad; abdomen, 12.5 mm. long, 8.7 mm. broad.

Cephalothorax.—Obovate, arched, chocolate brown, hairy. *Pars cephalica* ascending, truncated in front, segmental groove distinct; *ocular area* broader than long, raised; *clypeus* very narrow, dull grey. *Pars thoracica* retreating gently posteriorly, radial grooves distinct; *thoracic fovea* procurved; *marginal band* narrow, grey, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each; the front row procurved and the rear recurved; front lateral eyes large, elliptical, and poised obliquely; anterior intermediate pair round; the eyes of this row are very close to

each other, and also to the edge of the clypeus; lateral eyes of second row large, elliptical, poised obliquely, each just touching the apex of its anterior lateral neighbour; intermediate eyes of rear row small, widely separated, each touching its lateral neighbour (Pl. xxiii., fig. 88). *Legs*.—Moderately long, tapering, yellowish brown, clothed with long, fine black hairs, but displaying naked areas; each armed with long, fine black spines; metatarsi i. and ii. partially scopulated; tarsi i. and ii. fully so; relative lengths: 4, 1, 2, 3. *Palpi*.—Short, not strong, similar in colour and clothing to legs; tarsi scopulated. *Falces*.—Projected well forward, strong, concolorous with cephalothorax; clothed with long coarse hairs or bristles, but displaying naked areas; inner margin of the furrow of each falx armed with a row of ten strong teeth; in addition to these there is at base an intermediate row of six minute teeth; *fang* long, black, shining, well curved. *Maxillae*.—Yellowish, hairy, arched, heel well rounded, and thickly beset with small spines. *Labium*.—Concolorous submerged, free, short, broader than long, arched, sides rounded, apex slightly excavated and fringed with a row of strong bristles. *Sternum*.—Broad, somewhat pyriform, arched, concolorous with foregoing, hairy; *sigilla* marginal. *Abdomen*.—Obovate, arched, moderately overhanging base of cephalothorax, chocolate brown, densely clothed with long hairs. *Spinnerets*.—Yellow, hairy; superior pair long, tapering; the third joint of these is the longest, and the first and second are of equal length; inferior spinnerets short, and once their individual diameter apart.

Obs.—The example from Tambourine Mountain was dry. In the tube there is a label upon which had been pencilled, as a field note: "Open burrow."

Hab.—Eidsvold and Tambourine Mountain, Queensland.

ANAME HIRUTA, *sp. nov.*

(Pl. xxiii., figs. 89 and 90.)

♀. Cephalothorax, 10.5 mm. long, 9 mm. broad; abdomen, 14.2 mm. long, 9.8 mm. broad.

Cephalothorax.—Yellow brown, hairy, obovate, arched. *Pars cephalica* ascending, truncated in front, segmental groove distinct; *ocular area* broader than long, raised, fringed in front with bristles; *clypeus* narrow, indented at the middle, grey. *Pars thoracica* broad, radial grooves distinct; *thoracic fovea* procurved; *marginal band* narrow, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each, the front being slightly procurved and the rear recurved; lateral eyes of both rows of equal size, elliptical, poised obliquely, not touching; anterior medians round; rear medians elliptical, and smallest of the group (Pl. xxiii., fig. 89). *Legs*.—Moderately long, strong, concolorous with cephalothorax, hairy, but displaying naked areas, and armed with long, strong spines; metatarsi i. and ii. partially scopulated, the tarsi fully so; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, strong, concolorous with legs, and similar to them in clothing and armature; tarsi scopulated. *Falces*.—Projected well forward, strong, dark brown, arched, densely clothed with coarse hairs or bristles; inner ridge of the furrow of each falx armed with a row of twelve teeth; of these the five at the base are

very small; in addition to the row thus described there is an intermediate series of four minute teeth at the base of each falx; *fang* long, shining, dark brown, well curved. *Marilla*.—Yellow, arched, hairy, heel well rounded and thickly studded with a cluster of small spines. *Labium*.—Concolorous, submerged, arched, hairy, short, broader than long, apex excavated and fringed with bristles. *Sternum*.—Somewhat shield-shaped, concolorous also, arched, clothed with long, coarse black hairs; *sigilla* marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, chocolate brown, clothed with grey, silky hairs. *Spinnerets*.—Superior pair long, yellow, tapering, hairy, first joint longest and the second shortest: inferior spinnerets yellow-brown, cylindrical, hairy, and separated from each other by a space equal to once their individual transverse diameter.

Obs.—A second example, also from Mallala, is interesting from the fact that two eyes on one side are missing. The abnormality is not due to accident as the cephalothorax is uninjured (Pl. xxiii., fig. 90).

Hab.—Mallala, South Australia (April and May, 1908).

ANAME COMOSA, sp. nov

(Pl. xxiii., fig. 91.)

♀. Cephalothorax, 9.8 mm. long, 7.5 mm. broad; abdomen, 10.1 mm. long, 7.5 mm. broad.

Cephalothorax.—Dark brown, hairy, arched. *Pars cephalica* truncated in front, ascending, segmental groove distinct; *ocular area* broader than long; raised; *clypeus* dull grey, sloping forward, narrow, indented at middle. *Pars thoracica* retreating posteriorly, radial grooves distinct; *thoracic fovea* procurved; *marginal band* slightly reflexed, thickly fringed with fine hairs. *Eyes*.—Distributed over two rows of four each; front row slightly procurved, the rear recurved; front lateral eyes largest of the group, elliptical, and poised obliquely; anterior medians smaller than their lateral neighbours, round, separated from each other by a space equal to one-half their own individual diameter, and each again from its lateral neighbour by about the same space; the rear laterals are also elliptical, and seated obliquely, each just touching the apex of its anterior neighbour; rear medians small; widely separated, and each just touching its lateral neighbour (Pl. xxiii., fig. 91). *Legs*.—Moderately long, concolorous with cephalothorax, densely clothed with long, dark brown hairs, and displaying naked areas; each armed with long, black spines; *metatarsi* i. and ii. partially scopulated, the tarsi fully so; relative lengths: 4, 1, 2, 3. *Palpi*.—Rather long, moderately strong, concolorous with legs, densely hairy, and armed with black spines; tarsi scopulated. *Falces*.—Well projected, strong, thickly clothed with coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with seven strong teeth, in addition to which, there is at the base, an intermediate group of four very minute ones; *fang* long, well curved, shining, dark brown. *Maxilla*.—Dark brown, hairy, heel well rounded, and thickly studded with small spines; beard reddish grey. *Labium*.—Concolorous, submerged, short, broader than long, sparingly hairy, apex slightly

excavated, and thickly fringed with strong bristles. *Sternum*.—Somewhat pyriform, concolorous also, arched, hairy; *sigilla* marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, dark brown, densely hairy. *Spinnerets*.—Concolorous with abdomen, hairy; first joint of superior pair longest, and the second shortest; inferior spinners short, cylindrical, and separated from each other by a space equal to once their individual transverse diameter.

Obs.—The specimen from Langhorne's Creek had apparently only recently cast its skin; besides this, it was also damaged.

Hab.—Pichi Richi, and Langhorne's Creek, South Australia.

ANAME GRANDIS, *sp. nov.*

(Pl. xv., fig. 25, and Pl. xxiii., fig. 92.)

♀. Cephalothorax, 12.5 mm. long, 11.3 mm. broad; abdomen, 18.1 mm. long, 12.3 mm. broad (Pl. xv., fig. 25).

Cephalothorax.—Obovate, moderately hairy, mahogany brown, arched. *Pars cephalica* ascending, truncated in front, where it is furnished with a tuft of bristles at the middle; *ocular area* broader than long, raised, black; *clypeus* hyaline, rather broad, sloping steeply, indented at middle. *Pars thoracica* retreating posteriorly, radial grooves distinct; *thoracic fovea* deep, moderately procurved; *marginal band* broad, slightly reflexed, fringed with rather long, fine, grey hairs. *Eyes*.—Distributed over two rows of four each, compactly grouped; front row slightly procurved, the rear recurved; front and rear lateral eyes of equal size, elliptical, seated obliquely, their points just touching; front median eyes round, separated from each other by a space equal to once their own individual diameter, and again from their lateral neighbours by about half that space; rear intermediates small, elliptical, widely separated, each touching its lateral neighbour (Pl. xxiii., fig. 92). *Legs*.—Concolorous with cephalothorax, strong, tapering, moderately long, hairy, but displaying naked areas; each armed with strong black spines; metatarsi i. and ii. partially scopulated, the tarsi fully so; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, strong, concolorous with legs, hairy, spined; tarsi scopulated. *Falces*.—Dark brown, projected well forward, clothed with fine hairs and coarse bristles, and displaying naked areas; inner margin of the furrow of each falx armed with a row of nine strong teeth, in addition to which there is an intermediate group of four minute ones at the base; *fang* long, black, shining, well curved. *Maxillæ*.—Yellowish, clothed with long hairs, heel well rounded and thickly studded with small spines; beard reddish. *Labium*.—Concolorous, submerged, moderately hairy, arched, short, and fringed with bristles. *Sternum*.—Concolorous also, moderately hairy, shield-shaped, arched; *sigilla* marginal. *Abdomen*.—Obovate, arched, hairy, slightly projecting over base of cephalothorax, yellow-brown, with a dark brown median area extending on its upper surface from anterior extremity towards the spinnerets. *Spinnerets*.—Yellowish, hairy; superior pair tapering and having their first and second joints of equal length and the third joint the longest; inferior spinners short, narrowest at base, and separated from each other by a space equal to once their apical transverse diameter.

Obs.—Two specimens of this fine spider were collected at Pichi Richi and one at Woolshed Flat. Of the former one is fully matured, and the other nearly so. The latter are somewhat lighter in colour than the type.

Hab.—Pichi Richi and Woolshed Flat, South Australia.

ANAME AUREA, *sp. nov.*

(Pl. xxiii., fig. 93.)

♀. Cephalothorax, 10·4 mm. long, 8·2 mm. broad; abdomen, 13·4 mm. long, 8·2 mm. broad.

Cephalothorax.—Obovate, yellow, shining, sparingly clothed with yellow, adpressed hairs. *Pars cephalica* ascending, high, sides somewhat declivous, truncated in front, where there is at the middle a cluster of short black bristles; segmental groove distinct; *ocular area* raised, broader than long, yellow, but black at the summit; *clypeus* hyaline, moderately broad, sloping forward, indented at the middle. *Pars thoracica* retreating rearwards, radial grooves distinct; *thoracic fovea* procurved; *marginal band* thickly fringed with fine hairs. *Eyes.*—Distributed over two rows of four each; front row slightly procurved, the rear recurved; anterior laterals elliptical, poised obliquely, and distinctly the largest of the group; anterior medians round, separated from each other by a space equal to one-half their individual diameter, and each again from its lateral neighbour by about one-half that distance; rear laterals considerably smaller than their anterior lateral neighbours which they touch, elliptical, poised obliquely; rear medians minute, widely separated, elliptical also, each touching its lateral neighbour (Pl. xxiii., fig. 93). *Legs.*—Concolorous with cephalothorax, moderately long and strong, clothed with long, fine black hairs, but displaying naked areas; armed with short black spines; metatarsi i. and ii. partially scopulated, the tarsi wholly so; relative lengths: 4, 1, 2, 3. *Pulpi.*—Similar in colour, clothing and armature of legs; tarsi scopulated. *Fulces.*—Orange-red, projected well forward, thinly clothed with fine yellowish hairs and long, strong, black bristles; inner ridge of the furrow of each falx armed with a row of twelve strong teeth, in addition to which there is an intermediate series of four minute ones at the base; *fang* long, dark brown, shining, well curved. *Maxille.*—Yellow, arched, clothed with long, black hairs, heel well rounded and thickly studded with small, black spines. *Labium.*—Concolorous, small, broader than long, arched, submerged, sparingly clothed with moderately long, stiff black hairs; apex gently rounded, fringed with coarse bristles. *Sternum.*—Concolorous also, shield-shaped, rather flat, surface sparingly clothed with short, stiff black bristles, and the margins fringed with long black ones; *sigilla* marginal, orange-red, the posterior pair elongate and narrow. *Abdomen.*—Obovate, slightly overhanging base of cephalothorax, arched, yellow, and clothed with fine yellowish hairs. *Spinnerets.*—Yellow, hairy, superior pair tapering, the first joint longest, and the second shortest; inferior spinners cylindrical, and separated from each other by a space equal to once their individual transverse diameter.

Obs.—Four fully matured females, collected by Dr. McGillivray. *A. aurea* is a very distinct form, and is easily distinguished by its colour, the smallness of its rear lateral and median eyes, and the form of its posterior sternal sigilla.

Hab.—Broken Hill, New South Wales.

ANAME FLAVOMACULATA, *sp. nov.*

(Pl. xxiii., fig. 94.)

♀. Cephalothorax, 10.2 mm. long, 8.2 mm. broad; abdomen, 13.6 mm. long, 8.2 mm. broad.

Cephalothorax.—Obovate, shining, dark mahogany brown, arched, sparingly clothed with short, adpressed hairs. *Pars cephalica* high, ascending, truncated in front, sides somewhat declivous, segmental groove distinct; *ocular area* raised, broader than long; *clypeus* not broad, sloping gently forward, dark brown with a small yellowish patch at the middle, where there is also a tuft of stiff bristles. *Pars thoracica* broad, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* slightly reflexed, sparingly fringed with fine yellowish hairs. *Eyes.*—Distributed over two rows of four each; the front row slightly procurved, and the rear decidedly recurved; eyes of front row large; anterior laterals largest of the group, elliptical, and poised obliquely; anterior medians round, separated from each other by a space equal to about one-half their individual diameter, and each again from its lateral neighbour by about one-half that space; rear lateral eyes elliptical, poised obliquely, each just touching its anterior lateral neighbour; rear medians widely separated, elliptical, smallest of the group, each touching its lateral neighbour (Pl. xxiii., fig. 94). *Legs.*—Moderately long and strong, tapering, reddish-brown, hairy, but displaying naked areas; each armed with strong spines; metatarsi i. and ii. partially scopulated, the tarsi wholly so; relative lengths: 4, 1, 2, 3. *Pulpi.*—Long, moderately strong, similar in colour, clothing and armature to legs; tarsi scopulated. *Falces.*—Concolorous with cephalothorax, projected well forward, clothed with fine hairs and long, coarse bristles, but displaying naked areas; inner angle of the furrow of each falx armed with a row of ten strong teeth, in addition to which there is an intermediate series of six minute ones at the base; *fang* long, well curved, black, shining. *Maxillæ.*—Reddish-brown, inner angle yellowish, arched, hairy, heel well rounded, and thickly studded with short spines; beard reddish. *Labium.*—Concolorous also, arched, short, broader than long, submerged, apex excavated and fringed with black bristles. *Sternum.*—Concolorous also, shield-shaped, slightly arched, clothed with moderately long stiff black hairs; *sigilla* marginal. *Abdomen.*—Oval, slightly overhanging base of cephalothorax, arched, superior surface and sides brown, spotted with yellow, densely clothed with yellowish pile, and having in addition a number of short, black bristles, at anterior extremity; area above and at sides of spinnerets yellow; inferior surface dark brown, spotted with yellow; pulmonary sacs yellow; chitinous plate in front of *rima epigasteris*

clothed with fine yellowish hairs and long, black bristles, brownish yellow at the middle, and pale yellow laterally; in front the plate is acuminate, and creamy yellow. *Spinnerets*.—Superior pair tapering, hairy, dark brown, apices of first and second joints yellow; second joint shortest, and the third slightly the longest; inferior spinners somewhat club-shaped, hairy, dark brown, inner angles yellow; they are separated from each other by a space equal to once their individual transverse diameter.

Obs.—Two female examples, one of which is mature and the other half-grown. Field note reads: "No door."

Hab.—Tambourine Mountain, Queensland (October 6, 1912).

ANAME NEBULOSA, *sp. nov.*

(Pl. xxiii., figs. 95, 96, 97 and 98.)

♂. Cephalothorax, 5.6 mm. long, 4.4 mm. broad; abdomen, 5.1 mm. long, 3.2 mm. broad.

Cephalothorax.—Obovate, yellowish, clothed with dark brown hairs, which latter impart a smoky appearance, arched. *Pars cephalica*.—Ascending, truncated in front, segmental groove distinct, the groove and frontal area smoky; *ocular area* broader than long, raised; *clypeus* narrow, pale, not sloping. *Pars thoracica* broad, sides curved, posterior angle narrow, radial grooves smoky yellow, distinct; *thoracic fovea* deep, very slightly procurved; *marginal band* moderately broad, smoky yellow, fringed with long black hairs. *Eyes*.—Distributed over two rows of four each; front row procurved, the rear recurved; eyes of front row large; anterior laterals elliptical and poised obliquely; anterior medians round, and largest of the series; space between each eye of the front row sensibly less than one-half the individual diameter of one of the median anterior eyes; rear side eyes rather smaller than their anterior lateral neighbours; points of anterior and rear lateral eyes just meet; rear intermediates small, widely separated, each touching its lateral neighbour (Pl. xxiii., fig. 95). *Legs*.—Long, not strong, tapering, yellow, hairy, but displaying narrow naked areas, each well armed with long, dark spines; metatarsi i. and ii. partially scopulated, the rear fully so; no apophysis present on tibia i.; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, similar in colour and clothing to legs, and armed with short, weak spines; tarsal joint scopulated; bulb pyriform, bilobed, twisted, yellow, shining and terminating in a short, blunt style; no apophysis present (Pl. xxiii., fig. 96). *Falces*.—Short, not strong, smoky yellow, projecting, clothed with short fine hairs and coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with several moderately strong teeth. *Maxillæ*.—Yellow, arched, hairy, heel well rounded, near which latter there is a small cluster of microscopic spines; beard yellow. *Labium*.—Concolorous, arched, short, much broader than long, narrowest at apex, which latter is gently rounded and fringed with long black bristles; a few hairs are scattered over the surface; two or three small spines are also present near the apex.

Sternum.—Concolorous also, elongate, broadest between second and third pairs of coxæ, moderately arched, hairy; *sigilla* marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, yellow, with undefined smoky areas, densely clothed with long hairs. *Spinnerets*.—Yellow, hairy, superior pair long, tapering, second joint shortest; inferior pair very short, and close together.

Obs.—One male.

Hab.—Mallala, South Australia (March 23, 1905).

♀. Cephalothorax, 8·8 mm. long, 6·1 mm. broad; abdomen, 14·4 mm. long, 8·3 broad.

Cephalothorax.—Obovate, arched, smoky yellow, pilose. *Pars cephalica* ascending, moderately high, truncated in front, where there is a tuft of black bristles at the middle, thoracic grooves distinct; *ocular area* broader than long, slightly raised; *clypeus* narrow, hyaline, sloping forward, slightly indented at middle. *Pars thoracica* very gently retreating towards posterior angle, which latter is deeply indented, radial grooves distinct; *thoracic fovea* procurved, deep; *marginal band* pallid, fringed with moderately long dark hairs. *Eyes*.—Disposed similarly to male; the posterior laterals are, however, as large as their anteriors (Pl. xxiii., fig. 97). *Legs*.—Moderately long, yellow, clothed with dark brown hairs, but displaying naked areas; each armed with short stiff spines; metatarsi i. and ii. partially scopulated, the tarsi wholly so; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, not strong, similar in colour, clothing and armature to legs; tarsi scopulated. *Falces*.—Dark brown, projected, strong, moderately long, clothed with fine hairs and coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with a row of ten strong teeth; *fung* long, dark brown, shining, well curved. *Maxillæ*.—Yellow, hairy, arched, heel well rounded; above the latter there is a cluster of small spines; beard reddish. *Labium*.—Concolorous, short, broader than long, well arched, submerged, hairy, and furnished near apex with two or three small spines; apex slightly excavated, fringed with stiff bristles. *Sternum*.—Concolorous also, somewhat shield-shaped, arched, clothed with black bristles; *sigilla* marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, clothed with fine downy hairs; superior surface yellow, mottled with dark chocolate-brown, the latter forming a defined median design with lateral markings; sides yellow, mottled moderately with dark brown; inferior surface yellow (Pl. xxiii., fig. 98). *Spinnerets*.—Yellow, hairy; superior spinners rather long, tapering, first and third joints of about equal length, the second shortest; inferior spinners very short, and quite close together.

Obs.—The number of spines on the lip varies in different individuals of this species; in some there are three or four, in others two, whilst in one example before me only one is discernable. In some examples the abdominal pattern is more distinct than in others.

Hab.—Mallala, Aldgate, Tea Gardens (foot of Hills near Adelaide, November 4, 1917), Meningal (July, 1917), Scott's Creek, South Australia.

ANAME DECORA, sp. nov.

(Pl. xxiii., figs. 99, 100 and 101.)

♀. Cephalothorax, 10.2 mm. long, 7.8 mm. broad; abdomen 10.4 mm. long, 6.7 mm. broad.

Cephalothorax.—Elongate, obovate, yellow, sparingly clothed with very fine, pale yellowish hairs. *Pars cephalica* ascending, moderately high, truncated in front, segmental groove distinct; *ocular area* broader than long, raised; nearly black at summit; *clypeus* hyaline, moderately broad, steep, slightly excavated at middle. *Pars thoracica* retreating, posterior angle indented, radial grooves distinct; *thoracic fovea* deep, procurved; *marginal band* fringed with fine hairs. *Eyes*.—Distributed over two rows of four each; front row procurved, the rear recurved; anterior and rear side eyes largest of the group, of equal size, elliptical, and poised obliquely; anterior medians round, separated from each other by a space equal to once their own individual diameter, and each again from its lateral neighbour by about one-half that space; rear laterals widely removed, elliptical, each slightly smaller than its lateral neighbour which it touches (Pl. xxiii., fig. 99). *Legs*.—Concolorous with cephalothorax, moderately long, tapering, hairy, but displaying naked areas; each armed with moderately long spines; metatarsi and tarsi i. and ii. partially scopulated. *Palpi*.—Moderately long, similar in colour, clothing and armature to legs; tarsi scopulated. *Fulces*.—Dark brown, projecting, clothed with fine hairs and long, coarse bristles; inner margin of the furrow of each falx armed with a row of ten strong teeth; *fung* dark brown, shining, well curved. *Maxillæ*.—Arched, hairy, yellow, inner angle cream-yellow, and fringed with a reddish beard, heel well rounded; at the excavated angle above the latter there is a cluster of small spines. *Labium*.—Similar in colour and clothing to the maxillæ, submerged, short, broader than long; near the apex, which is slightly excavated, there are three small spines. *Sternum*.—Elongate, somewhat shield-shaped, yellow, arched, clothed with bristly hairs, and terminating just between fourth pair of coxæ in an obtuse point; *sigilla* marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, clothed with fine, short hairs; superior surface yellow with chocolate brown spots and median and lateral markings, the latter broken and forming a rather prominent, though undefined pattern (Pl. xxiii., fig. 101); sides yellow with chocolate brown spots; inferior surface ochreous yellow with a few chocolate brown spots and concolorous median and lateral markings; *pulmonary sacs* yellow; chitinous plate immediately in front of *rima epigasteris* shining, yellow, hairy, uneven, strongly arched at middle and compressed laterally. *Spinnerets*.—Yellow, hairy; superior pair tapering; first and third joints of equal length, second joint shortest; inferior spinners short, narrowest at the base, and separated from each other by a space equal to once their individual transverse diameter.

Obs.—This species presents another instance in which ocular malformation occurs and again, as in the case of *A. hirsuta* (ante, p. 142), the right side is affected, but in an example now under study, the rear laterals

and rear median eyes have coalesced, and so form one large, somewhat uniform eye. The front row of eyes is perfectly normal, and the cephalothorax is not injured in any way (Pl. xxiii., fig. 100).

Hab.—Clifton Gardens, Sydney, New South Wales.

ANAME ARMIGERA, *sp. nov.*

(Pl. xxiii., figs. 102 and 103.)

♀. Cephalothorax, 8.8 mm. long, 7.3 mm. broad; abdomen, 9 mm. long, 6.2 mm. broad.

Cephalothorax.—Obovate, arched, yellow, moderately clothed with fine, short pale yellowish hairs. *Pars cephalica* ascending, truncated in front where it is furnished at the middle with a tuft of stiff black bristles, sides compressed, somewhat declivous, segmental groove distinct; *ocular area* broader than long, raised; *clypeus* narrow, hyaline, slightly excavated at middle. *Pars thoracica* broad, radial grooves moderately distinct; *thoracic fovea* profound, slightly procurved; *marginal band* pale, broad, fringed with dark, moderately strong bristles. *Eyes*.—Distributed over two rows of four each, the front row being procurved, and the rear recurved; front laterals largest of the group, elliptical and poised obliquely; front medians round, separated from each other by a space equal to one-half their individual diameter, and each again from its lateral neighbour by about the same space; posterior lateral eyes smaller than their anterior lateral neighbours which they just touch, elliptical, and poised obliquely; rear medians smallest of the group, widely separated, elliptical also, each touching its lateral neighbour (Pl. xxiii., fig. 102). *Legs*.—Moderately long and strong, concolorous with cephalothorax, clothed with short, fine yellowish hairs and long coarse black bristles, but displaying naked areas; each well armed with long strong black spines, those on tibiae and metatarsi i. and ii. being the most numerous, and the longest and strongest; metatarsi i. and ii. partially scopulated, the tarsi fully so; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long and strong, similar in colour and clothing to legs, and armed with long, strong, black spines; tarsi scopulated. *Falces*.—Concolorous with cephalothorax, long, strong, arched, projected well forward, clothed with short, fine, silky pubescence and coarse, black bristles, but displaying naked areas; the upper inner angle of each falx is armed with moderately long and strong black spines similar to those on the legs (Pl. xxiii., fig. 103); inner ridge of the furrow of each falx armed with a row of seven strong teeth, in addition to which there is also present at the base an intermediate series of five microscopic teeth; *fang* long, dark brown, shining, well curved. *Maxillae*.—Clay yellow, surface rather flat, clothed with long, dark hairs and bristles, heel well rounded, base thickly studded with small spines, beard yellowish. *Labium*.—Short, free concolorous, submerged, broader than long, arched, clothed with a few long black bristles, apex slightly excavated, and fringed with black bristles; near apex there are three small spines. *Sternum*.—Concolorous also, broad, rather flat, well clothed with black bristles, of which the marginal ones are much the longest and strongest; *sigilla* not distinct, small, marginal.

Abdomen.—Obovate, arched, slightly overhanging base of cephalothorax, hairy, and furnished in front with a few rather long, black bristles; superior surface yellow, mottled with dark brown, but displaying no design; sides and inferior surface yellow, densely clothed with a mixture of fine yellow and rather long and stiff dark brown hairs; *pulmonary sacs* and chitinous plate in front of *rima epigasteris* yellow, shining, and clothed with stiff black hairs; two *sigilla* present on chitinous plate. *Spinnerets*.—Yellow, hairy; superior pair tapering, second joint shortest; inferior spinners cylindrical, nearly as long as basal joint of superior pair, separated from each other by a space equal to that of once their own individual transverse diameter.

Hab.—Mullawa, West Australia, collected by Miss F. May.

ANAME MACULATA, *sp. nov.*

(Pl. xxiii., fig 104.)

♀. Cephalothorax, 7·3 mm. long, 6·2 mm. broad; abdomen, 10·5 mm. long, 7·4 mm. broad.

Cephalothorax.—Obovate, yellow, arched, clothed with fine yellowish pubescence. *Pars cephalica* ascending gently, not high, truncated in front, furnished at middle with a tuft of black bristles, segmental groove distinct; *ocular area* broader than long, raised, summit black, *clypeus* narrow, hyaline. *Pars thoracica* rather broad, uneven, radial grooves almost completely obscured by the dense clothing of pile; *thoracic fovea* very slightly procurved; *marginal band* slightly reflexed, and fringed with very fine hairs. *Eyes*.—Distributed over two rows of four each; front row slightly procurved and the rear recurved; front laterals elliptical and poised obliquely, slightly larger than their rear lateral neighbours which are also elliptical and poised obliquely, and which they just touch; anterior medians largest of the group, round, separated from each other by a space equal to about three-quarters their own individual diameter, and each again from its lateral neighbour by less than one-half the diameter of one of the anterior median eyes; rear intermediate eyes smallest of the group, widely separated from each other, each just touching its lateral neighbour (Pl. xxiii., fig. 104). *Legs*.—Moderately long, not strong, tapering, yellow, hairy, but displaying naked areas, armed with long, black spines, those on tibiae, and metatarsi iii. and iv. being the strongest and most numerous; metatarsi i. and ii. partially scopulated, the tarsi fully so; relative lengths: 1, 4, 2, 3. *Palpi*.—Moderately long, strong, similar in colour and clothing to legs, and armed with strong spines; tarsi scopulated. *Fulces*.—Concolorous with cephalothorax, projected well forward, clothed with fine hairs and long coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with nine strong teeth, in addition to which there is at the base, an intermediate series of four minute ones; *fang* long, well curved, reddish brown, shining. *Maxilla*.—Yellow, arched, hairy, furnished at base with a dense cluster of small spines, heel well rounded. *Labium*.—Concolorous, moderately hairy, short, broader than long, apex very slightly excavated. *Sternum*.—Concolorous also, somewhat shield-shaped, arched, hairy, angles fringed with long, black bristles; *sigilla* not distinct, small, marginal. *Abdomen*.—Obovate, arched, slightly

overhanging base of cephalothorax, clothed with short, fine hairs; superior surface and sides dark brown, mottled with pale yellow spots; inferior surface hairy, yellow, flecked with irregular clusters of brown spots in front of spinnerets. *Spinnerets*.—Yellow, hairy; superior pair elongate, tapering, second joint shortest, first and third of equal length; inferior spinners cylindrical, close together, and about one-half the length of joint i. of superior spinners.

Obs.—Collector's note: "No door to burrow; spun across with web."

Hab.—Jarrahdale Road, Armadale, West Australia (May 26, 1912).

ANAME CENOSA, *sp. nov.*

(Pl. xxiii., fig. 105.)

♀. Cephalothorax, 7.5 mm. long, 6.4 mm. broad; abdomen, 10.9 mm. long, 7.5 mm. broad.

Cephalothorax.—Obovate, yellow-brown, arched, furnished with a few scattered, fine, yellowish hairs. *Pars cephalica* not very high, ascending gently, smooth, pencilled with dark brown down the middle, segmental groove distinct; *ocular area* raised, broader than long, dark brown; *clypeus* narrow, hyaline, and furnished at the middle with a tuft of black bristles. *Pars thoracica* broad, uneven, radial grooves profound; *thoracic fovea* deep, procurved; *marginal band* slightly reflexed, fringed with fine yellowish hairs. *Eyes*.—Distributed over two rows of four each; front row very slightly procurved, the rear recurved; front and rear laterals touching each other, elliptical and obliquely poised; of these the former is slightly the largest; anterior median eyes large, round, separated from each other by a space equal to about one-half their individual diameter, and each again from its lateral neighbour by about the same space; rear medians very small, elliptical, widely removed, each just touching its lateral neighbour (Pl. xxiii., fig. 105). *Legs*.—Yellow, tapering, not strong, hairy, but displaying naked areas, each armed with strong spines, those on tibiae iii. and iv. being the longest and strongest; scopulation normal; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, similar in colour and clothing to legs, armed with strong spines; tarsi scopulated. *Falces*.—Concolorous with cephalothorax, strong, moderately projected, clothed with fine hairs and coarse bristles, but displaying extensive naked areas; inner ridge of the furrow of each falx armed with nine strong teeth; *fang* long, well curved, shining, reddish brown. *Maxillæ*.—Yellow, hairy, arched, heel well rounded, and furnished with a few small spines. *Labium*.—Concolorous, short, broader than long, arched, hairy, apex excavated, and fringed with bristles. *Sternum*.—Concolorous also, broad, shield shaped, rather flat, clothed with long, dark bristles; *sigilla* marginal. *Abdomen*.—Obovate, arched, hairy, slightly overhanging base of cephalothorax; superior surface and sides dark brown, mottled with dull yellow spots; inferior surface yellow-brown. *Spinnerets*.—Yellow, hairy; superior pair not very long, rather widely apart, tapering, second joint shortest; inferior pair very short, about twice their individual diameter apart.

Hab.—Little Kalkabury, Yorke Peninsula, South Australia (September, 1907).

ANAME FUSCOCINCTA, *sp. nov.*

(Pl. xxiv., fig. 106.)

♀. Cephalothorax, 7.4 mm. long, 5.6 mm. broad; abdomen, 7.4 mm. long, 4.6 mm. broad.

Cephalothorax.—Obovate, yellow-brown, arched, sparingly clothed with fine yellowish hairs. *Pars cephalica* ascending, moderately high, truncated in front where it is furnished at the middle with a tuft of stiff bristles, thoracic groove distinct; *ocular area* raised, black, broader than long; *clypeus* broad, hyaline, deeply indented at middle. *Pars thoracica* uneven, radial grooves profound; *thoracic fovea* deep, procurved; *marginal band* broad, reflexed, dark brown, fringed with rather long, yellowish hairs. *Eyes*.—Distributed over two rows of four each; front row procurved, the rear recurved; anterior median eyes round, largest of the series, and separated from each other by a space equal to that of one-half their own individual diameter, and each again from its lateral neighbour by about one-half that space; front and rear lateral eyes elliptical, obliquely poised, and just touching each other; front laterals rather larger than their rear neighbours; rear median eyes widely removed, smallest of the group, somewhat elliptical, obliquely poised, each just touching its lateral neighbour (Pl. xxiv., fig. 106). *Legs*.—Concolorous with cephalothorax, moderately long, tapering, not strong, hairy, but displaying naked areas, spines rather long, but weak; scopulation of metatarsi and tarsi i. and ii. normal; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, not strong, similar in colour and clothing to legs; tibial spines strong; tarsi scopulated. *Fulces*.—Concolorous with cephalothorax, projected well forward, clothed with fine hairs and coarse bristles; inner ridge of the furrow of each falx armed with a row of ten strong teeth, in addition to which there is at the base an intermediate series of six minute ones; *fang* long, dark brown, shining, well curved. *Maxillæ*.—Yellow, arched, hairy, heel well rounded, and thickly studded with small spines. *Labium*.—Concolorous, short, broader than long, arched, submerged, surface furnished with a few bristles, apex slightly excavated, and fringed with bristles. *Sternum*.—Concolorous also, shield-shaped, arched, moderately clothed with black bristles; *sigilla* marginal. *Abdomen*.—Obovate, arched, slightly overhanging base of cephalothorax, densely clothed with long hairs; superior surface dark brown, the sides yellow-brown; inferior surface yellow. *Spinnerets*.—Yellow, hairy; superior pair rather long, tapering, the first joint longest and the second shortest; inferior spinners cylindrical, nearly as long as basal joint of superior spinnerets, separated from each other by a space equal to once their individual transverse diameter.

Obs.—Collector's note: "Open tube; thickly lined with web, not carried above the surface. Tube 4 in. deep."

Hub.—Kalamunda, near Perth, West Australia (May 17, 1912).

ANAME PULCHRA, *sp. nov.*

(Pl. xxiv., figs. 107 and 108.)

♂. Cephalothorax, 7.5 mm. long, 6 mm. broad; abdomen, 5.8 mm. long, 3.8 mm. broad.

Cephalothorax.—Obovate, arched, dark brown, densely clothed with pale yellowish pile. *Pars cephalica* very gently ascending, not high, truncated in front, sides rather declivous, segmental groove almost hidden by the dense pile with which the carapace is clothed; *ocular area* raised, broader than long, furnished in front with a tuft of stiff bristles; *clypeus* pallid, narrow. *Pars thoracica* broad, radial grooves almost hidden by thick pile; *thoracic fovea* deep, straight; *marginal band* fringed with rather long, fine yellowish hairs. *Eyes*.—Distributed over two rows of four each; front row strongly procurved, the rear recurved; front median eyes round, largest of the group, separated from each other by a space equal to about one-third their own individual diameter, and each again from its lateral neighbour by about half a diameter; anterior and posterior lateral eyes slightly elliptical and poised obliquely; of these the rear lateral eyes are the smallest; side eyes separated from each other by a space equal to about the diameter of one of the rear lateral eyes; rear median eyes minute, each in close juxtaposition to a front anterior and a rear lateral eye (Pl. xxiv., fig. 107). *Legs*.—Long, tapering, not strong, concolorous with cephalothorax, hairy, but showing naked areas, and armed with spines of which those on tibiae and metatarsi iii. and iv. are the longest and strongest; scopulation normal; no apophysis present on tibia i.; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, not strong, similar in colour and clothing to legs; tarsal joint short, scopulated; bulb dark brown, shining, pyriform, bilobed, and terminating in a moderately long, pointed style; tibial joint furnished with spined apophysis (Pl. xxiv., fig. 108). *Falces*.—Dark brown, slightly projected, hairy, but displaying naked areas; several moderately strong teeth on the inner ridge of the furrow of each falx; *fang* reddish brown, shining. *Maxillæ*.—Yellow, arched, heel well rounded. *Labium*.—Concolorous, arched, moderately hairy, broader than long, submerged, apex gently excavated, and fringed with bristles. *Sternum*.—Concolorous also, elongate, shield-shaped, rather flat, hairy; *sigilla* small, marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, densely clothed with long brown and yellowish hairs; superior surface dark brown, relieved by an interrupted median narrow longitudinal yellow band and transverse lateral yellow bars, the two broadest of which are at the middle; the longitudinal band and transverse bars spotted with dark brown; inferior surface chrome yellow, tinged in places with brown. *Spinnerets*.—Pale yellow, hairy; basal joint of superior pair longest, the terminal very short and dome-shaped; inferior spinners minute, close together.

Obs.—Collector's note reads: "Under log, with burrow covered by simple web."

Hab.—Tambourine Mountain, Queensland (October, 1912).

ANANE ROBUSTA, sp. nov.

(Pl. xxiv., fig. 109.)

♀. *Cephalothorax*, 12.2 mm. long, 11.3 mm. broad; abdomen, 12.5 mm. long, 6.8 mm. broad,

Cephalothorax.—Obovate, broad, arched, yellow, very sparingly clothed with silky pubescence. *Pars cephalica* ascending, truncated in front, where it is yellowish red, pencilled with brown down the middle, sides declivous; segmental groove distinct; *ocular area*, broader than long, close to edge of clypeus, raised, summit dark brown; *clypeus* narrow, sloping slightly forward, hyaline, and furnished with a tuft of bristles at the middle. *Pars thoracica* broad, retreating somewhat sharply to posterior angle, uneven, radial grooves rather broad, but not deep, posterior angle narrow; *thoracic fovea* deep, procurved; *marginal band* yellow, slightly reflexed, fringed with short, black bristles. *Eyes*.—Distributed over two rows of four each, the front row procurved, and the rear recurved; front and rear lateral eyes elliptical, poised obliquely, their black rings touching; front laterals largest of the group; anterior medians large, round, and separated from each other by a space equal to about three-quarters their own individual diameter, and each again from its lateral neighbour by a similar space; rear median eyes smallest of the group, widely separated from each other, and each just touching its lateral neighbour (Pl. xxiv., fig. 109). *Legs*.—Strong, moderately long, concolorous with cephalothorax, hairy, but displaying naked areas, each armed with spines, those on tibiae and metatarsi iii. and iv. being the most numerous and the strongest; scopulation of metatarsi and tarsi i. and ii. normal; relative lengths: 4, 1, 2, 3. *Palpi*.—Strong, moderately long, similar in colour and clothing to legs, armed with long, black spines; tarsi scopulated. *Fulces*.—Yellow, darker than cephalothorax, strong, projected well forward, arched, inner angles of upper surface yellow brown, sparingly hairy and displaying extensive naked areas; apices densely clothed with long black bristles; inner ridge of the furrow of each falx armed with a row of nine strong teeth, in addition to which there is at the base an intermediate series of four or five minute ones; *fang* long, dark brown, shining, well curved. *Maxillæ*.—Yellow, hairy, arched, heel well rounded, and studded with a dense cluster of small spines. *Labium*.—Concolorous, arched, submerged; broader than long, furnished with a few bristles, apex gently excavated. *Sternum*.—Concolorous also, shield-shaped, arched, clothed with strong, black hairs or bristles, of which the marginal ones are much the longest and strongest; *sigilla* elongate, marginal, narrow. *Abdomen*.—Obovate, arched, moderately overhanging base of cephalothorax, dark brown, densely clothed with long hairs. *Spinnerets*.—Yellow, hairy; superior pair tapering, first and third joints longest, and of equal length; inferior pair very short, cylindrical, and separated from each other by a space equal to once their individual transverse diameter.

Hab.—Cross Roads, Mannum, South Australia (April, 1908).

ANAME CONFUSA, *sp. nov.*

(Pl. xxiv., fig. 110.)

♀. *Cephalothorax*, 0.2 mm. long, 7.5 mm. broad; abdomen, 11.1 mm. long, 7 mm. broad.

Cephalothorax.—Obovate, elongate, yellow, arched, hairy. *Pars cephalica* ascending, rather high, truncated in front, sides declivous,

segmental groove distinct; *ocular area* broader than long, fringed in front with a tuft of bristles, summit black; *clypeus* rather narrow, sloping forward, slightly excavated at the middle. *Pars thoracica* uneven, radial grooves not deep, partially obscured by hairs; *thoracic fovea* deep, procurved; *marginal band* yellow, undulated, rather broad, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each; front row slightly procurved and the rear slightly recurved; anterior and rear lateral eyes of equal size, nearly touching each other, elliptical, obliquely poised, anterior medians largest of the group, round, separated from each other by a space equal to once their own individual diameter, and each again from its lateral neighbour by about the same space; rear median eyes smallest of the group, but not minute, widely separated from each other, elliptical, each just touching its lateral neighbour (Pl. xxiv., fig. 110). *Legs*.—Concolorous with cephalothorax, strong, hairy, but displaying naked areas, each armed with long but not very strong spines; scopulation of metatarsi and tarsi i. and ii. normal; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, similar in colour, clothing and armature to legs; tarsi scopulated. *Falves*.—Yellowish brown, projected well forward, clothed with fine hairs and long, coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with seven strong teeth; *fang* long, dark brown, shining, well curved. *Maxillæ*.—Yellow, arched, hairy, furnished with a few small spines at base of inner angle, heel well rounded. *Labium*.—Concolorous, somewhat submerged, short, broader than long, apex slightly excavated and fringed with long, strong bristles, below which latter there are two or three small spines. *Sternum*.—Concolorous also, shield-shaped, arched, hairy; *sigilla* marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, arched, hairy; superior surface yellow, mottled with chocolate-brown patches and spots, both of which latter form a somewhat confused design; sides and inferior surface yellow. *Spinnerets*.—Yellow, hairy; superior pair tapering, first and second joints longest and of equal length; inferior pair very short, cylindrical, and separated from each other by a space equal to once their own individual transverse diameter.

Hab.—Mylor Road, South Australia (October, 1908).

ANAME CONFUSA, VAR. *a*, *var. nov.*

♀. Cephalothorax, 9 mm. long, 7 mm. broad; abdomen, 8.4 mm. long, 5 mm. broad.

In all details except those of size and abdominal colour and clothing, *var. a* agrees with the example chosen as the type. Its description is as follows:—

Abdomen.—Obovate, slightly overhanging base of cephalothorax, densely clothed with very long hairs; superior surface dark brown, with one large round yellow spot near anterior extremity; in addition to this there is also a number of small and obscure yellowish spots; sides dark brown, obscurely mottled with yellow; inferior surface yellow with dark brown areas in front, and at the sides of the spinnerets, the latter, which are also yellow, are clothed with dark brown hairs.

Obs.—*Var. a* of this species bears a rather close resemblance to *A. fuscocincta* (ante p. 153); the eyes, however, are very different; moreover, *fuscocincta* has no labial spines.

Hab.—Mylor Road, South Australia (October, 1908).

ANAME INTRICATA, sp. nov.

(Pl. xxiv., fig. 111.)

♀. Cephalothorax, 8 mm. long, 5.5 mm. broad; abdomen, 9.1 mm. long, 5.5 mm. broad.

Cephalothorax.—Obovate, yellow, arched, sparingly pubescent. *Pars cephalica* moderately high, ascending, segmental groove distinct; *ocular area* raised, yellow-brown, broader than long; *clypeus* narrow, sloping forward, hyaline. *Pars thoracica* uneven, radial grooves distinct; *thoracic fovea* very slightly procurved; *marginal band* fringed with rather long black hairs. *Eyes.*—Distributed over two rows of four each, the front row procurved and the rear recurved; eyes of front row close together, the laterals being slightly the largest of the group, elliptical, and poised obliquely; anterior intermediates round; rear side eyes smaller than their anterior lateral neighbours, the apices of which they just touch, elliptical, and poised obliquely; rear intermediates smallest of the group, elliptical, widely separated, each just touching its outer neighbour (Pl. xxiv., fig. 111). *Legs.*—Concolorous with cephalothorax, hairy, but displaying naked areas, moderately strong, rather long, tapering, armed with long strong spines; scopulation of legs i. and ii. normal; relative lengths: 4, 1, 2, 3. *Pulpi.*—Moderately long and strong, concolorous with legs, similar in armature and clothing to legs i. and ii. *Falces.*—Concolorous with cephalothorax, projected, moderately strong, clothed with fine hairs and stiff bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with a row of eight strong teeth, in addition to which there is an intermediate series of five minute ones; *fang* long, strong, shining, reddish brown, well curved. *Maxilla.*—Yellow, arched, clothed with long hairs, excavated round the tip where it is thickly studded with spines; heel well rounded. *Labium.*—Concolorous with foregoing, and similar to it in clothing, arched, broader than long, not spined, apex slightly excavated. *Sternum.*—Concolorous with labium, broad, somewhat shield-shaped, arched, clothed with rather long hairs, and margined with stiff bristles. *Abdomen.*—Obovate, arched, hairy, slightly overhanging base of cephalothorax; superior surface dark brown, intricately mottled with pale yellow; sides and inferior surface yellow. *Spinnerets.*—Pale yellow, hairy; superior pair tapering, first and third joints equally long, second joint shortest; inferior spinners very short, cylindrical, about twice their own individual transverse diameter apart.

Hab.—Blackwood River, South West Australia.

ANAME BUTLERI, sp. nov.

(Pl. xxiv., fig. 112.)

♀. Cephalothorax, 7 mm. long, 4.7 mm. broad; abdomen, 7.8 mm. long, 4.7 mm. broad.

with a cluster of small spines. *Labium*.—Concolorous, submerged, rather broader than long, arched, apex slightly rounded, two or three small spines present, surface clothed with bristly hairs. *Sternum*.—Concolorous with labium, pyriform, hairy; *sigilla* round, small, marginal. *Abdomen*.—Obovate, slightly overhanging base of cephalothorax, densely clothed with long hairs; superior surface dark brown, mottled with yellow; inferior surface yellow brown. *Spinnerets*.—Yellow, hairy; superior pair tapering, third joint rather longer than the first, the second much the shortest; inferior pair cylindrical, and separated from each other by a space equal to rather more than once their own individual transverse diameter.

Obs.—Collector's note: "Several males crawling about."

Hab.—Morialta, above first waterfall, South Australia.

CHENISTONIA TEPPERI, Hogg.

Chenistonia tepperi, Hogg, Proc. Zool. Soc., 1902, p. 137, pl. xiii., fig. 13.

Hab.—Mylor Road (October, 1911), and Mount Lofty, South Australia.

CHENISTONIA HOGGI, Rainbow.

Chenistonia hoggi, Rainbow, Rec. Austr. Mus., x., 8, 1914, p. 240, figs. 50, 51.

Hab.—Kaianga Valley, New South Wales.

CHENISTONIA AUROPILOSA, sp. nov.

(Pl. xxiv., fig. 115.)

♀. Cephalothorax, 7.2 mm. long, 6 mm. broad; abdomen, 6.8 mm. long, 4.7 mm. broad.

Cephalothorax.—Obovate, yellow, arched, moderately clothed with fine golden yellow pile. *Pars cephalica* ascending, moderately high, sides somewhat compressed; *ocular area* broader than long, raised, summit dark brown, fringed in front with a tuft of stiff bristles; *clypeus* moderately broad, hyaline, slightly excavated at middle. *Pars thoracica* rather broad, uneven, radial grooves distinct; *thoracic fovea* deep, straight, *marginal band* yellow, undulated, fringed with yellow hairs. *Eyes*.—Distributed over two rows of four each, the front row procurved, and the rear recurved; front side eyes largest of the group, elliptical, and poised obliquely; front middle eyes round, and separated from each other by a space equal to three-quarters that of their own individual diameter, and each again from its lateral neighbour by about one-half that space; rear lateral eyes are elliptical, poised obliquely, and of the same diameter as the front middle; front and rear side eyes closely approximating, but not touching; posterior medians smallest of the group, widely separated, truncated at apex, each touching the ring of its outer neighbour (Pl. xxiv., fig. 115). *Legs*.—Concolorous with cephalothorax, moderately long, tapering, clothed with dark hairs, but displaying on each patella a

narrow, naked area; each limb armed with moderately long and strong black spines; all tarsi scopulated, and a portion of metatarsi i. and ii.; relative lengths; 4, 1, 2, 3. *Palpi*.—Long, moderately strong, similar in colour, clothing and armature to legs; tarsi scopulated. *Fulces*.—Concolorous with cephalothorax, projected well forward, moderately strong, clothed with short fine hairs and long coarse bristles, but displaying naked areas; inner ridge of the furrow of each falk armed with a row of eight strong teeth; in addition to these there is at the base an intermediate series consisting of four small teeth, and several minute ones; *fang* long, reddish-brown, well curved. *Maxillæ*.—Yellow, hairy, arched, excavated at base, where it is thickly studded with small spines; heel well rounded; beard yellowish. *Labium*.—Concolorous, arched, moderately hairy, free, submerged, not spined, short, broader than long, apex slightly excavated and fringed with long hairs. *Sternum*.—Concolorous also, nearly round, arched, hairy; *sigilla* rather small, marginal. *Abdomen*.—Obovate, very slightly overhanging base of cephalothorax, arched, clothed with long golden-yellow hairs; superior surface dark brown, spotted with yellow, the spots, however, only showing when the animal is immersed in alcohol; sides and inferior surface yellow. *Spinnerets*.—Yellow, hairy; superior pair tapering, the third joint longest and the second shortest; inferior spinners cylindrical, and separated from each other by a space equal to once their own individual diameter.

Obs.—The spinnerets in the type have been unduly distended. Collector's field note reads: "Open burrow."

Hab.—Armadales, West Australia (May 23, 1912).

CHENISTONIA VILLOSA, *sp. nov.*

(Pl. xxiv., fig. 116.)

♀. Cephalothorax, 10·3 mm. long, 8·4 mm. broad; abdomen, 10·9 mm. long, 6 mm. broad.

Cephalothorax.—Obovate, dark reddish-brown, arched, sparingly pilose. *Pars cephalica* smooth, gently ascending, fringed in front of eyes with a tuft of stiff bristles, segmental groove distinct; *ocular area* broader than long, raised; *clypeus* narrow, rather dark, hyaline. *Pars thoracica* uneven, radial grooves distinct; *thoracic fovea* straight; *marginal band* narrow, undulated, fringed with rather long hairs. *Eyes*.—Distributed over two rows of four each, the front row procurved and the rear recurved; front laterals much the largest of the group, elliptical, and poised obliquely; front median eyes round, separated from each other by a space equal to about three-fourths their own individual diameter, and each again from its lateral neighbour by about half a diameter; rear laterals larger than anterior median eyes, elliptical, poised obliquely, each touching apex of its anterior lateral neighbour; posterior medians almost round, smallest of the group, widely separated, each just touching its lateral neighbour (Pl. xxiv., fig. 116). *Legs*.—Moderately long, concolorous with cephalothorax, hairy, but displaying naked areas, each armed with long, strong spines, those on legs i. and ii. being the most numerous; scopulation normal;

relative lengths: 4, 1, 2, 3. *Palpi*.—Similar in colour, clothing and armature to legs i. and ii. *Falces*.—Dark brown, nearly black, projected well forward, clothed with fine hairs and coarse bristles; inner ridge of the furrow of each falx armed with a row of nine strong teeth, in addition to which there is, near the base, a series of three or four minute ones; beard red; *fung* long, black, shining, well curved. *Muxillæ*.—Reddish yellow, shining, arched, hairy, excavated round the lip, at which point there is a thick cluster of small spines; inner angle yellow, beard red; heel well rounded. *Labium*.—Short, broad, arched, shining, apex excavated, and fringed with bristles; there are also a few hairs on the surface, but no spines. *Sternum*.—Concolorous, broad, oval, arched, hairy; *sigilla* marginal. *Abdomen*.—Oval, arched, slightly overhanging base of cephalothorax, dark brown, thickly clothed with long, grey hairs. *Spinnerets*.—Dark brown, hairy; superior pair tapering, first and third joints of equal length, second shortest; inferior pair short, cylindrical, and close together.

Obs.—One female with young.

Hab.—Carlotta Brook, Karri Country, West Australia (December, 1917).

Genus Sungenia,¹⁷ *gen. nov.*

Allied to Hogg's genera *Chenistonia* and *Dekana* by the tibial apophysis on leg i. terminating in a powerful spine, but differing from the former by the *thoracic fovea* being strongly procurved instead of straight, and from the latter in having the posterior sternal *sigilla* marginal instead of being away from the margin, each of which are major features from a generic standpoint. The *eyes* are mounted upon a tubercle, the area of which is broader than long, they are distributed over two rows of four each, the front one being procurved, and the rear recurved; the anterior and lateral eyes are of equal size and largest of the group; anterior medians round; rear medians smallest of the group.

SUNGENIA ATRA, *Strand.*

Chenistonia (Dekana) atra, Strand. Zoologisch. Jahrb., 1913, p. 601.

Hab.—Balingup, South West Australia (December, 1917).

Genus Ixamatus, *Simon.*

As pointed out in a former paper by one of the writers¹⁸ of this essay, the definition of the genus *Ixamatus* is not very clear. The forms described by L. Koch and Hogg were all males, whilst *I. distinctus*, Rainbow, and the one hereunder described are females.

According to Hogg¹⁹ the *thoracic fovea* of his *I. gregori* is straight, whilst that of *I. broomi* of the same author is long, and deep, and clearly

¹⁷ οὐγγενία, kinship.

¹⁸ Rainbow—Rec. Austr. Mus., v., 8, 1914, pp. 235-6 and 238.

¹⁹ Hogg—P.Z.S., 1901, pp. 268 and 260.

recurved. In *I. varius*, L. Koch, the fovea is straight, as is the case with the form described hereunder; *I. distinctus*, on the other hand, has the fovea slightly procurved. If the shape and direction of the thoracic fovea is of strict generic importance, then *I. broomi* and *I. distinctus* will ultimately have to be accommodated in other genera, though for the present it may be as well to let them remain where they have been placed.

IXAMATUS DISTINCTUS, *Rainbow*.

Ixamatus distinctus, *Rainbow*, *Rec. Austr. Mus.*, x., 8, 1914, p. 237, figs. 48 and 49.

Obs.—A single female, and an immature example. For notes in respect of the genus *Ixamatus*, Simon, see author's notes, *supra*, p. 235-237.

Hab.—Eidsvold, Queensland.

IXAMATUS MACULATUS, *sp. nov.*

(Pl. xxiv., fig.-117.)

♀. Cephalothorax, 4·7 mm. long, 3·4 mm. broad; abdomen, 5·8 mm. long, 3·2 mm. broad.

Cephalothorax.—Obovate, dark brown, arched, sparingly pubescent. *Pars cephalica* ascending, moderately high, segmental groove distinct; *ocular area* nearly black, broader than long, raised, fringed in front with a small tuft of bristles; *clypeus* narrow, dark, hyaline. *Pars thoracica* uneven, radial grooves moderately distinct; *thoracic fovea* deep, straight *marginal band* undulated, slightly reflexed, fringed with rather long hairs. *Eyes*.—Distributed over two rows of four each, the front row being procurved, and the rear recurved; front lateral eyes largest of the group, elliptical, and poised obliquely; front medians round, very slightly smaller than the long diameter of the rear lateral eyes, separated from each other by about once their own individual diameter, and each again from its lateral neighbour by rather less than that space; rear side eyes elliptical, poised obliquely; posterior intermediates smallest of the group, but not minute, oval, each just touching the ring of its outer neighbour (Pl. xxiv., fig. 117). *Legs*.—Moderately long, not strong, yellow, clothed with dark brown hairs, but displaying naked areas, each limb bespined; tarsi i. and ii. only scopulated; relative lengths: 4, 1, 2, 3. *Pulpi*.—Rather long, moderately strong, similar in colour, clothing and armature to legs; tarsi scopulated. *Fulces*.—Concolorous with cephalothorax, projecting, moderately strong, clothed with fine hairs and coarse bristles; inner ridge of each falx armed with a row of six moderately strong teeth; *fung* shining, reddish-brown. *Maxilla*.—Yellow, hairy, slightly excavated at base, where there is a cluster of small spines; beard yellow; heel well rounded. *Labium*.—Concolorous, short, broader than long, free, submerged, apex fringed with bristles and slightly excavated; no spines present. *Sternum*.—Concolorous also, yellow, shield-shaped, arched, moderately clothed with black, stiff, bristly hairs; *sigilla*

moderately large, marginal. *Abdomen*.—Obovate, arched, hairy, slightly overhanging base of cephalothorax, superior surface dark brown, mottled with yellow spots; sides and inferior surface yellow, flecked with dark brown spots and markings. *Spinnerets*.—Yellow, hairy; superior pair tapering; inferior spinners about one-and-a-half their transverse diameter apart.

Obs.—Two females, one slightly larger and darker than the other. Found in open burrow.

Hab.—Armadale, West Australia (May 25, 1912).

Genus Stanwellia, gen. nov.

Cephalothorax.—Obovate. *Pars cephalica*, arched, ascending, rather high; *ocular area* raised, broader than long. *Pars thoracica* arched; *thoracic fovea* straight. *Eyes*.—Distributed over two rows of four each, front row slightly procurved, the rear recurved; front lateral eyes largest of the group, elliptical, rear medians the smallest; rear eyes, both side and intermediate, large and elliptical. *Legs*.—Moderately long; metatarsi i. and ii. scopulated; tarsi iii. and iv. scopulated; tarsal claws, three. *Falces*.—Inner ridge only of the furrow of each falx dentated; no *rustellum*. *Labium*.—Free, short, broader than long, apex slightly excavated. *Sternum*.—Longer than broad; *sigilla* moderate in size, marginal. *Spinnerets*.—Superior pair moderately long, tapering, second joint shortest; inferior pair short, rather stout, close together.

STANWELLIA DECORA, *sp. nov.*

(Pl. xxiv., fig. 118.)

♀. Cephalothorax, 9.8 mm. long, 8.2 mm. broad; abdomen, 11.5 mm. long, 7.1 mm. broad.

Cephalothorax.—Obovate, dark brown, arched, well clothed with golden yellow pubescence. *Pars cephalica* ascending, high, truncated in front, segmental groove distinct; *ocular area* raised, arched, broader than long, nearly black, fringed in front with a tuft of stiff bristles; *clypeus* narrow, precipitate, hyaline. *Pars thoracica* moderately broad, radial grooves distinct; *thoracic fovea* rather deep, straight; *marginal band* fringed with fine black hairs. *Eyes*.—Distributed over two rows of four each, the front row being slightly procurved, and the rear very distinctly recurved, anterior lateral eyes largest of the group, elliptical, and poised obliquely; anterior medians round, and separated from each other by a space equal to about once their own individual diameter, and each again from its lateral neighbour by a space scarcely equal to that distance; rear lateral and intermediate eyes close together, their apices touching, elliptical; the outer eyes are poised obliquely, and are but very slightly larger than their intermediate neighbours; under the micrometer the rear outer lateral eyes measure five, and the intermediate one four and three-quarters (Pl. xxiv., fig. 118). *Legs*.—Moderately long and strong, tapering, concolorous with cephalothorax, hairy, but displaying naked areas, each limb armed with long

fine spines, those on legs iii. and iv. being the most numerous; metatarsi and tarsi i. and ii. scopulated; tarsi iii. and iv. only scopulated; claws three, inferior claw very small: relative lengths: 4, 1, 2, 3. *Palpi*.—Concolorous with legs, short, strong, hairy, spined; tarsi scopulated. *Falces*.—Projected, dark brown, well clothed with short, fine hairs and coarse bristles, but displaying naked areas; inner ridge of the furrow of each falx armed with nine strong teeth, in addition to which there is an intermediate series of three or four minute ones at the base. *Maxillæ*.—Reddish-brown, inner angle yellow, arched, hairy, excavated at base, where there is a cluster of small spines, heel well rounded, beard red. *Labium*.—Concolorous, short, very slightly broader than long, arched, free; three or four small spines near apex, which latter is slightly excavated, and fringed with stiff bristles; a few fine hairs on surface. *Sternum*.—Concolorous with labium, slightly arched, elongate, broadest between third pair of coxæ, clothed with stiff bristles; *sigilla* moderate in size, marginal, posterior pair largest. *Abdomen*.—Obovate, arched, hairy, slightly overhanging base of cephalothorax; superior surface yellow, ornamented with broken or interrupted brown markings, the latter forming an irregular design consisting of a longitudinal band and three or four transverse bars; inferior surface yellow with dark brown spots. *Spinnerets*.—Pale yellow, hairy; superior pair nearly half as long as cephalothorax, tapering, second joint slightly the shortest, first and third of equal length; inferior spinners very short, rather thick, rounded at apex, and separated from each other by a space equal to once their own individual transverse diameter.

Obs.—Two immature examples were collected [R.H.P.] in August, 1908, and two fully grown ones in August, 1910. Of the latter one is considerably lighter in colour than the other. Probably it is slightly the younger of the two.

Hab.—Stanwell Park, New South Wales.

Genus Atrax, O. P. Cambr.

ATRAX VALIDA, sp. nov.

(Pl. xxiv., fig. 119.)

♀. Cephalothorax, 12.6 mm. long, 9.6 mm. broad; abdomen, 14.8 mm. long, 9.6 mm. broad.

Cephalothorax.—Obovate, dark brown, arched, shining, very sparingly clothed with fine yellow hairs. *Pars cephalica* fringed in front with short, fine black hairs, ascending, high, slightly depressed on each side of eye space, sloping gently from summit to clypeus, sides compressed and unevenly indented, a median fringe of long, moderately stiff black bristles runs from base to ocular area, which latter is broader than long; *clypeus* narrow, precipitous, undulated, yellowish at sides, reddish-brown at middle, where it is furnished with a rather large tuft of black bristly hairs. *Pars thoracica* uneven, radial grooves distinct; *thoracic fovea* moderately deep, procurved; *marginal band* narrow, yellowish, fringed with stiff black hairs. *Eyes*.—Distributed over two rows of four each; viewed from the side the front row is straight, or but very slightly procurved; rear row recurved;

front lateral eyes largest of the group, elliptical, and poised obliquely; anterior medians round, once their own individual diameter apart, and each separated again by about half that space from its lateral neighbour; rear laterals elliptical, and poised obliquely; rear medians smallest of the group, each just touching its lateral neighbour; both rows close together, and the front one near the edge of clypeus (Pl. xxiv., fig. 119). *Legs*.—Not long, powerful, hairy, but displaying narrow naked areas, each limb armed with short stiff spines; relative lengths: 4, 1, 2, 3. *Palpi*.—Short, strong, similar in colour, clothing and armature to legs. *Falces*.—Strong, well projected, concolorous with cephalothorax, clothed with long, coarse hairs and bristles, and displaying no naked areas; inner ridge of the furrow of each falx armed with a row of nine strong teeth, and the outer with a row of eleven; in addition to these there is a thickly clustered group of minute teeth running from base to apex, and forming an intermediate series; *fang* long, black, strong, well curved. *Maxillæ*.—Reddish-brown, arched, strong, hairy, inner angle terminating in an obtuse point, base excavated, heel well rounded; greater portion of the surface of each maxilla thickly studded with small spines. *Labium*.—Free, concolorous, short, slightly longer than broad, arched, apex fringed with long bristles, entire surface thickly studded with small spines, thereby presenting a strongly granulated appearance. *Sternum*.—Concolorous also, shield-shaped, densely hairy, arched; posterior *sigilla* large and marginal. *Abdomen*.—Ovate, slightly overhanging base of cephalothorax, arched, dark brown, hairy. *Spinnerets*.—Short, yellow, stout, clothed with dark brown hairs; superior pair tapering, second joint shortest; inferior spinners very small, and separated from each other by a space equal to about that of once their own individual transverse diameter.

Obs.—Several specimens of this fine spider were collected by one of us [R.H.P.] and Dr. T. Bancroft. Younger examples display some little variation in the number and distribution of the intermediate series of falx teeth. Our field note reads:—"With expanded web; no lid." From the nest of one example an ova-sac was obtained. The sac is white, large, round, flat, measuring 90 mm. in circumference, cushion-shaped, closely woven, and of very strong texture.

Hab.—Tambourine Mountain, Queensland (May 10, and October 7, 1912).

Group ANEPSIADEÆ.

For the reception of the following species there appears to be no alternative but to erect a new group and a new genus. For the group we propose the name *Anepsiades*, and for the genus that of *Anepsiada*. The example under study agrees with *Atrax*, O. P. Cambr., and *Hudronyche*, L. Koch, in having both ridges of each falx armed with teeth, and also by the presence of an intermediate row, but it differs from each of the genera named by the sternal *sigilla* being marginal, and also by the absence of tarsal scopula. Like *Hudronyche* the cephalic segment is large, raised, and round, though not so much so as in *Misulena*, Walck. The labium is not as defined and figured by L. Koch²⁰ in his description

²⁰ L. Koch—Die Arach. des Austr., i., 1873, p. 468, pl. xxxv., fig. 6b.

of the genus *Hadronyche* but conforms more to that as described by Hogg.²¹ There are three tarsal claws, each of which, including the inferior, are well developed. The spinnerets also differ from the *Atracæ*, the first joint of the superior pair being longer than the second, but not longer than the second and third combined. Taking these several points into consideration, we consider the only place where the form now under consideration can be placed is after the group *Poikilomorphiæ*, of Rainbow.

Genus Anepsiada,²² gen. nov.

Cephalothorax.—*Pars cephalica* raised and rounded as in *Hadronyche*, L. Koch; *ocular area* broader than long, not raised; *clypeus* narrow. *Pars thoracica* uneven, radial grooves distinct; *thoracic fovea* deep, procurved. *Eyes*.—Distributed over two rows of four each, the front row being slightly procurved, and the rear recurved. *Legs*.—Short, not strong, tarsi armed with three claws, no scopulæ present; relative lengths: 4, 1, 2, 3. *Palpi*.—Short, not strong. *Fulces*.—Moderately projected; inner and outer ridges of each falx armed with teeth, in addition to which there is an intermediate row. *Maxillæ*.—Short, spined, base not excavated, apex of inner angle terminating obtusely. *Labium*.—Short, broader than long, free, surface bespined. *Sternum*.—Broad, shield-shaped, anterior angle curved well round the tip, and terminating on each side in an acuminate point; *sigilla* marginal, posterior pair large. *Spinnerets*.—Short; the superior pair have the first joint longer than the second, but not longer than the second and third combined.

ANEPSIADA VENTRICOSA, sp. nov.

(Pl. xxiv., fig. 120.)

♀. *Cephalothorax*, 4.8 mm. long, 4 mm. broad; abdomen, 8.3 mm. long, 5.6 mm. broad.

Cephalothorax.—Obovate, shining, yellow-brown, broadest near front pair of legs. *Pars cephalica* high, ascending, truncated in front, deeply impressed on each side near the base, thoracic groove distinct; *ocular area* broader than long, not raised; *clypeus* narrow. *Pars thoracica* broad, uneven, retreating, radial grooves profound; *thoracic fovea* deep, procurved. *Eyes*.—Distributed over two rows of four each, the front row being slightly procurved, and the rear recurved; both rows close together; front lateral eyes largest of the group, elliptical, and poised obliquely; anterior medians round and separated from each other by a space equal to that of one-half their own individual diameter, and each again from its lateral neighbour by about half that space; rear lateral eyes elliptical also and obliquely poised; anterior intermediates smallest of the group, widely separated, each just touching the ring of its outer neighbour (Pl. xxiv., fig. 120). *Legs*.—Not long, moderately strong, concolorous with cephalothorax, hairy, but displaying naked areas; each

²¹ Hogg—Proc. Zool. Soc., 1901, p. 274.

²² ἀνεψιάδης, a female cousin.

tarsus and metatarsus armed with strong spines; the hairs with which the legs are clothed are long and coarse; superior claws have each at the base two large teeth, succeeded by four very small ones; relative lengths: 4, 1, 2, 3. *Palpi*.—Short, not strong, similar in colour, clothing and armature to legs. *Falces*.—Rather strong, moderately projected, arched, shining, hairy, but displaying naked areas; apical hairs red; inner ridge of the furrow of each falx armed with nine strong teeth, and the outer with ten; in addition to these there is at the base four or five minute ones; *fang* moderately long, well curved. *Maxillæ*.—Yellowish-brown, hairy, arched, not excavated at base, inner angle bearded with yellow, and terminating obtusely at apex; inner area from base to near apex thickly spined. *Labium*.—Free, concolorous, short, broader than long, arched, almost the entire surface thickly spined; apex gently curved. *Sternum*.—Concolorous also, broad, somewhat shield-shaped, arched, hairy, broadest between third pair of coxæ, anterior angle curved well round the lip, and terminating at each side in an acuminate point; *sigilla* marginal, the third pair largest. *Abdomen*.—Obovate, yellow-brown, well arched, slightly overhanging base of cephalothorax, the surface clothed with fine yellow hairs. *Spinnerets*.—Yellow, hairy, short; superior pair not stout, tapering, first joint longest, the second shortest; inferior spinners very small, cylindrical, apices round, separated from each other by a space equal to that of once their own individual transverse diameter.

Hab.—Cloncurry, Central Queensland.

Group DOLICHOSTERNEÆ.

For the reception of the following remarkable species we propose a new group, Dolichosternæ, and a new genus, *Dolichosternum*. This group is placed near the end of the subfamily Diplurinae, to which, from the fact that the unique example now under study possesses three claws and four spinnerets, has the lip free, and is devoid of a rastellum, it would seem to belong. One of the most interesting features of this extraordinary spider is that the sternum is very long and attenuated, its measurements being: Length, 4.5 mm., and width, at its widest part, 1 mm. In fact, it looks more like an elongated, bluntly-pointed spine. The superior spinners are also widely apart, and the *anal tubercle* well developed. In all other respects it is a true Diplurid. The interesting novelty was collected by Dr. T. Bancroft, at Eidsvold, Queensland.

Genus Dolichosternum,²³ *gen. nov.*

Cephalothorax.—Obovate, truncated in front. *Pars cephalica* ascending gently; *ocular area* broader than long, raised; *clypeus* narrow. *Pars thoracica* retreating; *thoracic fovea* moderately deep, procurved. *Eyes*.—Distributed over two rows of four each; anterior row procurved, rear row recurved. *Legs*.—Moderately long, not strong; metatarsi and tarsi i. and ii. scopulated; relative lengths: 4, 1, 2, 3. *Palpi*.—Moderately long, not strong, tarsi scopulated. *Falces*.—Projected well forward;

²³ δολιχο, narrow, στερον, chest; = narrow chest.

inner angle only of furrow of each falc armed with teeth. *Maxillæ*.—Slightly excavated at base, heel rounded. *Labium*.—Short, broad, free. *Sternum*.—Long, narrow, broadest at base, and terminating obtusely between fourth pair of coxæ; coxæ long. *Abdomen*.—Obovate. *Spinnerets*.—Superior pair moderately long, stout, tapering, first joint longest, the second shortest; inferior pair small, close together.

DOLICHOSTERNUM ATTENUATUM, sp. nov.

(Pl. xxiv., figs. 121 and 122.)

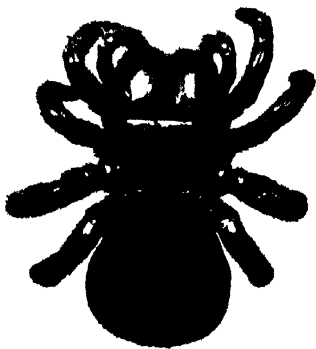
♀. Cephalothorax, 8·9 mm. long, 5·6 mm. broad; abdomen, 9·6 mm. long, 6·6 mm. broad; sternum, 4·5 mm. long, 1 mm. broad at its widest point.

Cephalothorax.—Obovate, truncated in front, arched, dark brown (nearly black), sparingly clothed with fine yellow hairs. *Pars cephalica* smooth, moderately high, ascending, sides somewhat declivous, segmental groove faintly distinct; *ocular area* broader than long, raised; *clypeus* very narrow. *Pars thoracica* smooth, radial grooves indistinct; *thoracic fovea* deep, procurved; *marginal band* narrow, undulating, slightly reflexed, fringed with fine hairs. *Eyes*.—Distributed over two rows of four each; front row slightly procurved, the rear distinctly recurved; eyes of front row close together; of these the laterals are slightly the largest, and poised obliquely; anterior medians round; rear laterals elliptical, poised obliquely, each nearly touching its lateral neighbour; rear medians widely separated, elliptical also, smallest of the group, each touching its lateral neighbour (Pl. xxiv., fig. 121). *Legs*.—Dark reddish-brown, moderately long, not strong, tapering, hairy, but displaying naked areas, armed with moderately long black spines; metatarsi and tarsi i. and ii. scopulated; relative lengths; 4, 1, 2, 3. *Palpi*.—Moderately long, not very strong, similar in colour, clothing and armature to legs, tarsi scopulated. *Falces*.—Concolorous with cephalothorax, projected well forward, clothed with fine hairs and coarse bristles, but displaying naked areas; inner angle of the furrow of each falc armed with six strong teeth. * *Maxillæ*.—Reddish-brown, long, hairy, arched, angle near lip slightly excavated, heel well rounded, basal area thickly studded with small spines; beard reddish yellow. *Labium*.—Yellowish, moderately hairy, arched, submerged, short, broad as long, apex rounded and fringed with long bristles; no spines present. *Sternum*.—Elongate, narrow, well arched, broadest between coxæ i. and ii., apex obtusely pointed, and terminating between coxæ iv., surface smooth, and with the sides furnished with a few long, fine hairs; no *sigilla* present (Pl. xxiv., fig. 122). *Abdomen*.—Obovate, dark brown, hairy; arched, slightly overhanging base of cephalothorax. *Spinnerets*.—Dull yellowish, hairy; superior pair tapering, rather widely apart, first joint longest, second shortest; inferior spinners short, very close together; *anal tubercle* well developed.

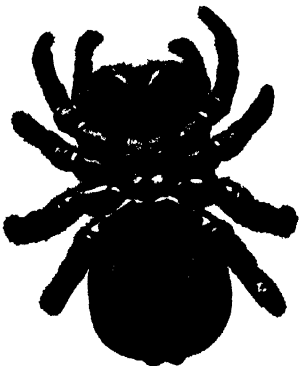
Hab.—Eidsvold, Queensland.

EXPLANATION OF PLATE XII.

- Fig. 1. *Missulena occatoria*, Walck., ♀, from above (enlarged).
„ 2. „ „ „ „ „ beneath „
„ 3. *Aganippe subtristis*, O. P. Cambr., ♀ (enlarged).
„ 10. *Dyarcyops melancholicus*, ♀, Rainb. and Pull., eyes.



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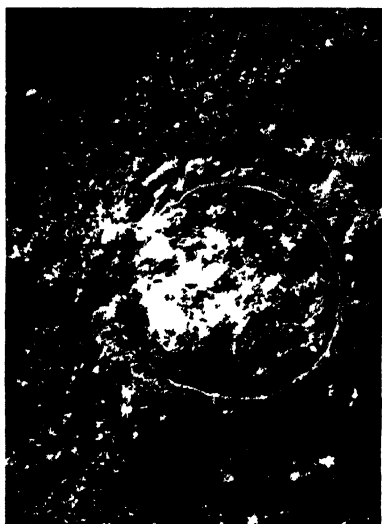
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EXPLANATION OF PLATE XIII.

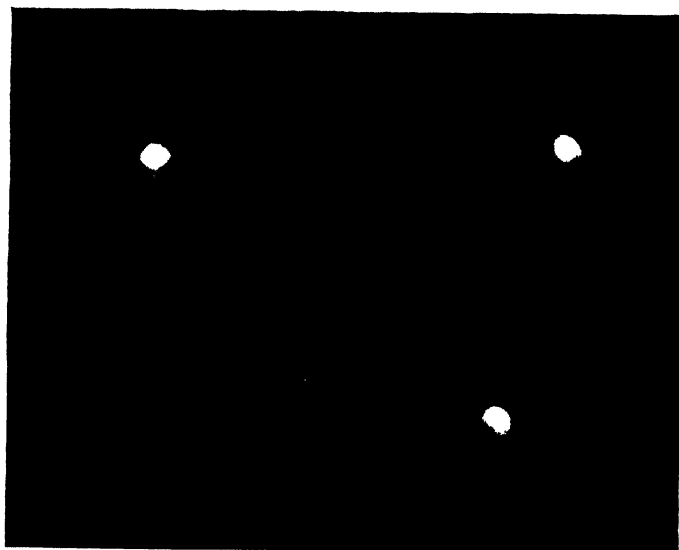
- Fig. 4. *Aganippe modesta*, Rainb. and Pull., nest closed.
" 5. " " " " " open.
" 8. *Blakistonia aurea*, Hogg, nests with lids open (greatly reduced).



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EXPLANATION OF PLATE XIV.

- Fig. 6. *Blakistonia aurea*, Hogg, ♂.
„ 9. *Dyareyops biróí*, Kulcz., ♀.
„ 11. *Arbanitis pulchellus*, Rainb. and Pull., ♀.
„ 12. *Tambouriniana variabilis*, Rainb. and Pull., ♀.



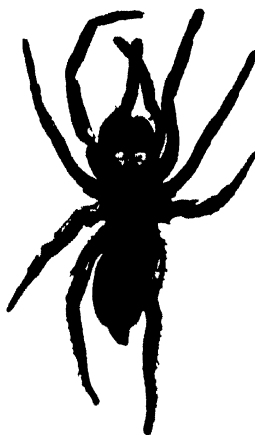
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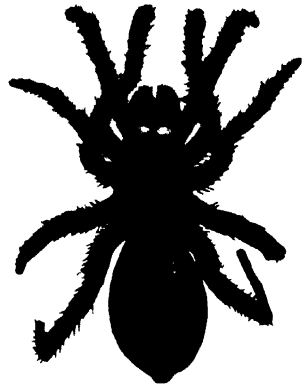
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EXPLANATION OF PLATE XV.

- Fig. 7. *Blakistonia aurea*, Hogg, ♀ (natural size).
,, 13. *Euoplos spinnipes*, Rainb., ♀ ,,
,, 16. *Armadalia setosa*, Rainb. and Pull., ♀ (enlarged).
,, 25. *Aname grandis*, Rainb. and Pull., ♀ (slightly enlarged).



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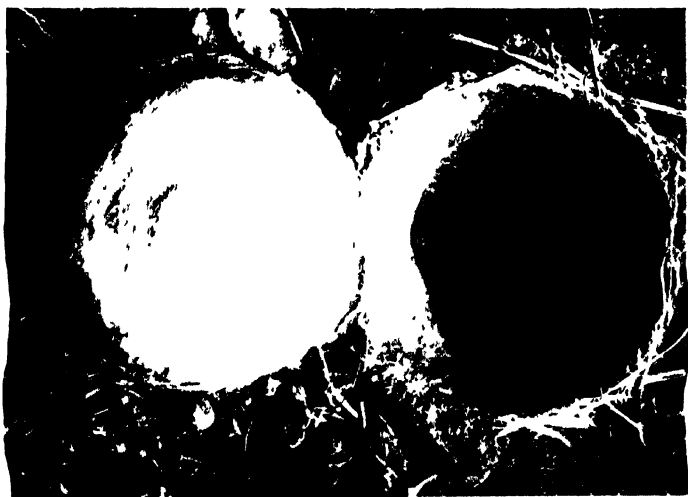
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EXPLANATION ON PLATE XVI.

Fig. 14. *Euoplos spinnipes*, Rainb , nest closed (natural size)
„ 15. „ „ „ „ nest open „ „



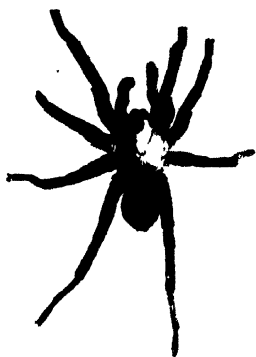
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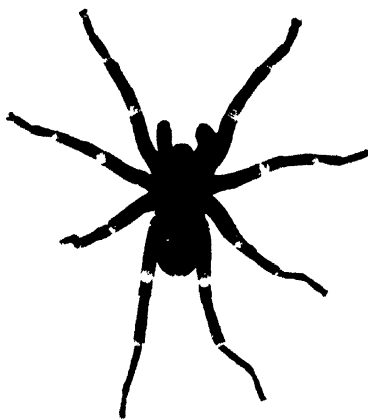
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EXPLANATION OF PLATE XVII.

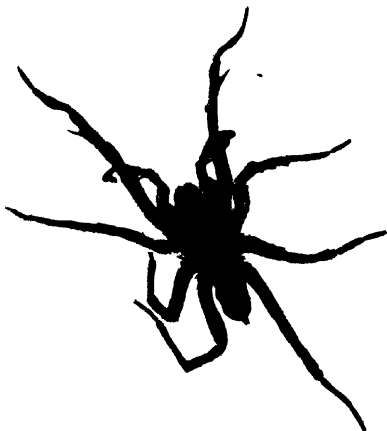
- Fig. 17. *Lampropodus scintillans*, Rainb. and Pull., ♂, from above.
 " 18. " " " " ♂, from beneath.
 " 19. " " " " ♀, from above.
 " 20. " " " " ♀, from beneath.
 " 31. *Chenistonia major*, Hogg, ♂.



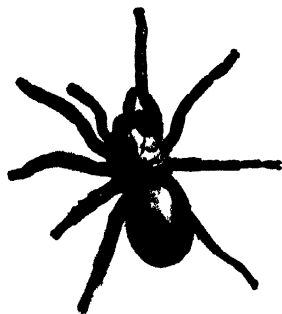
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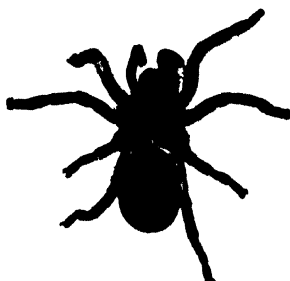
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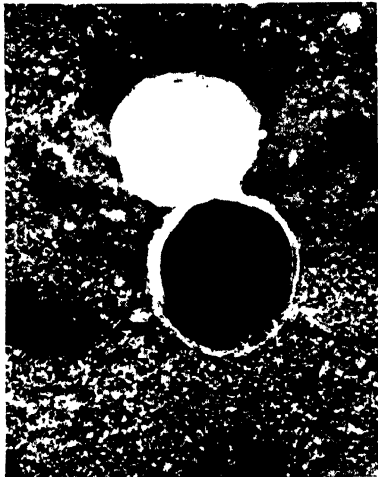
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EXPLANATION OF PLATE XVIII.

- Fig. 21.** *Lampropodus scintillans*, Rainb. and Pull., nest closed.
„ **22.** „ „ „ „ nest open.
„ **29.** *Atrax valida*, Rainb. and Pull., ♀.
„ **30.** „ *versuta*, Rainb., ♀ (enlarged).



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EXPLANATION OF PLATE XIX.

- Fig. 23. *Lampropodus iridescent*, Rainb. and Pull., ♂, from above
(enlarged).
„ 24. „ „ „ Rainb. and Pull., ♂, from beneath
(enlarged).



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EXPLANATION OF PLATE XX.

Fig. 26. *Aname nebulosa*, Rainb. and Pull., entrance to nest.

- | | | | | | | |
|----|-----|----|---|----|----|---|
| ,, | 27. | ,, | , | ,, | ,, | longitudinal section of nest :
a upper part, b ball of earth
in position, c spider. |
| ,, | 28. | ,, | , | ,, | ,, | longitudinal section of nest :
a cuff open, b ball of earth,
c spider. |



26

a

a



27

b

c



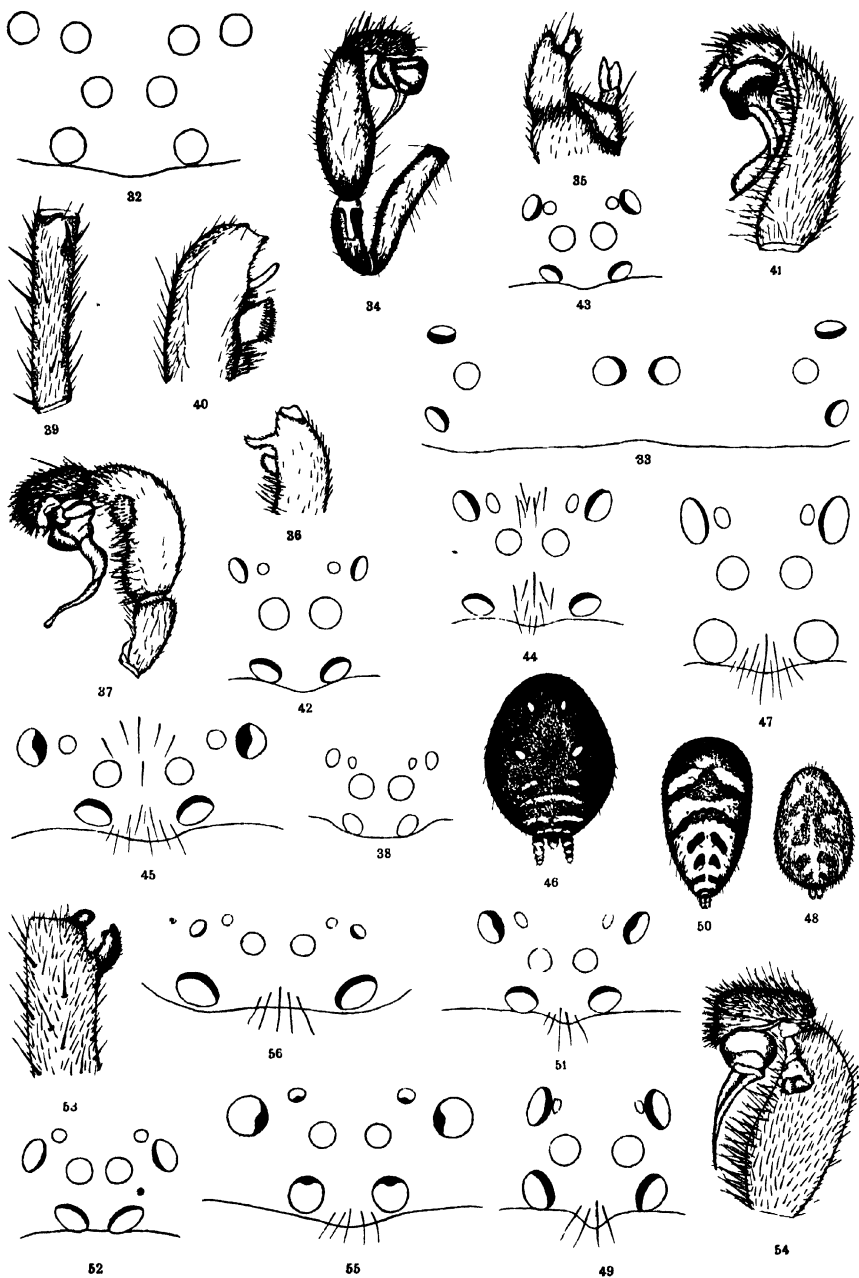
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b

c

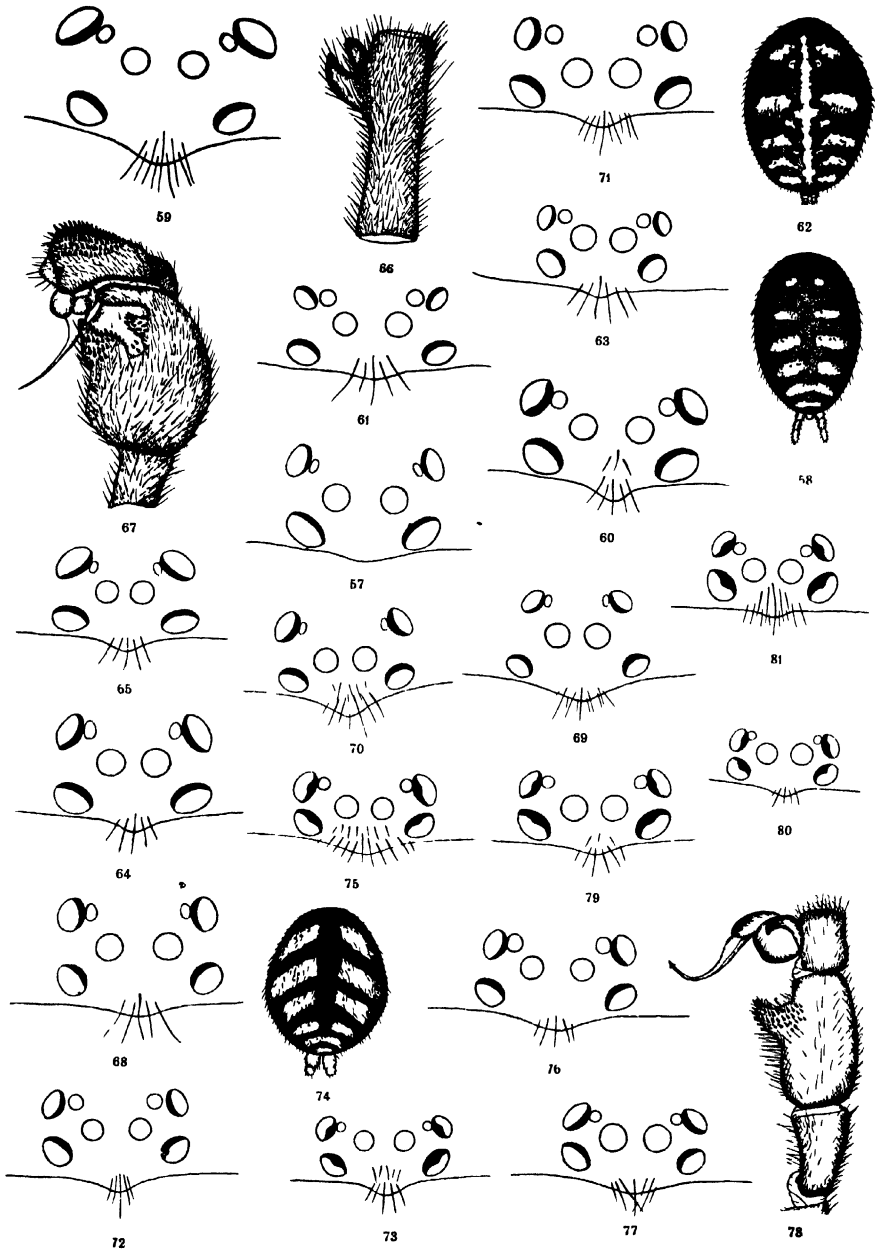
EXPLANATION OF PLATE XXI.

- Fig. 32. *Aganippe subtristis*, O. P. Cambr., ♂, eyes.
 „ 33. *Missulena reflexa*, Rainb. and Pull., ♂, „
 „ 34. „ „ „ „ ♂, palpus.
 „ 35. *Aganippe subtristis*, O. P. Cambr., ♂, apophysis of tibia i.
 „ 36. „ „ „ „ ♂, apophysis of palpus.
 „ 37. „ „ „ „ ♂, palpus.
 „ 38. „ *rhapsiduca*, Rainb. and Pull., ♂, eyes.
 „ 39. „ „ „ „ ♂, apophysis, tibia i.
 „ 40. „ „ „ „ ♂, apophysis of palpus.
 „ 41. „ „ „ „ ♂, palpus.
 „ 42. „ „ „ „ ♀, eyes.
 „ 43. „ *bancrofti*, „ „ ♀, „
 „ 44. „ *villosa*, „ „ ♀, „
 „ 45. „ *robusta*, „ „ ♀, „
 „ 46. „ „ „ „ ♀, abdomen.
 „ 47. „ *modesta*, „ „ ♀, eyes.
 „ 48. „ „ „ „ ♀, abdomen.
 „ 49. „ *ornata*, „ „ ♀, eyes.
 „ 50. „ „ „ „ ♀, abdomen.
 „ 51. „ *pelochroa*, „ „ ♀, eyes.
 „ 52. *Anidiops manstridgei*, Pocock, ♂, eyes.
 „ 53. „ „ „ „ ♂, palpus, apophysis.
 „ 54. „ „ „ „ ♂, palpus.
 „ 55. *Gaius hirsutus*, Rainb. and Pull., ♀, eyes.
 „ 56. *Dyarcyops ionthus*, Rainb. and Pull., ♀, eyes.



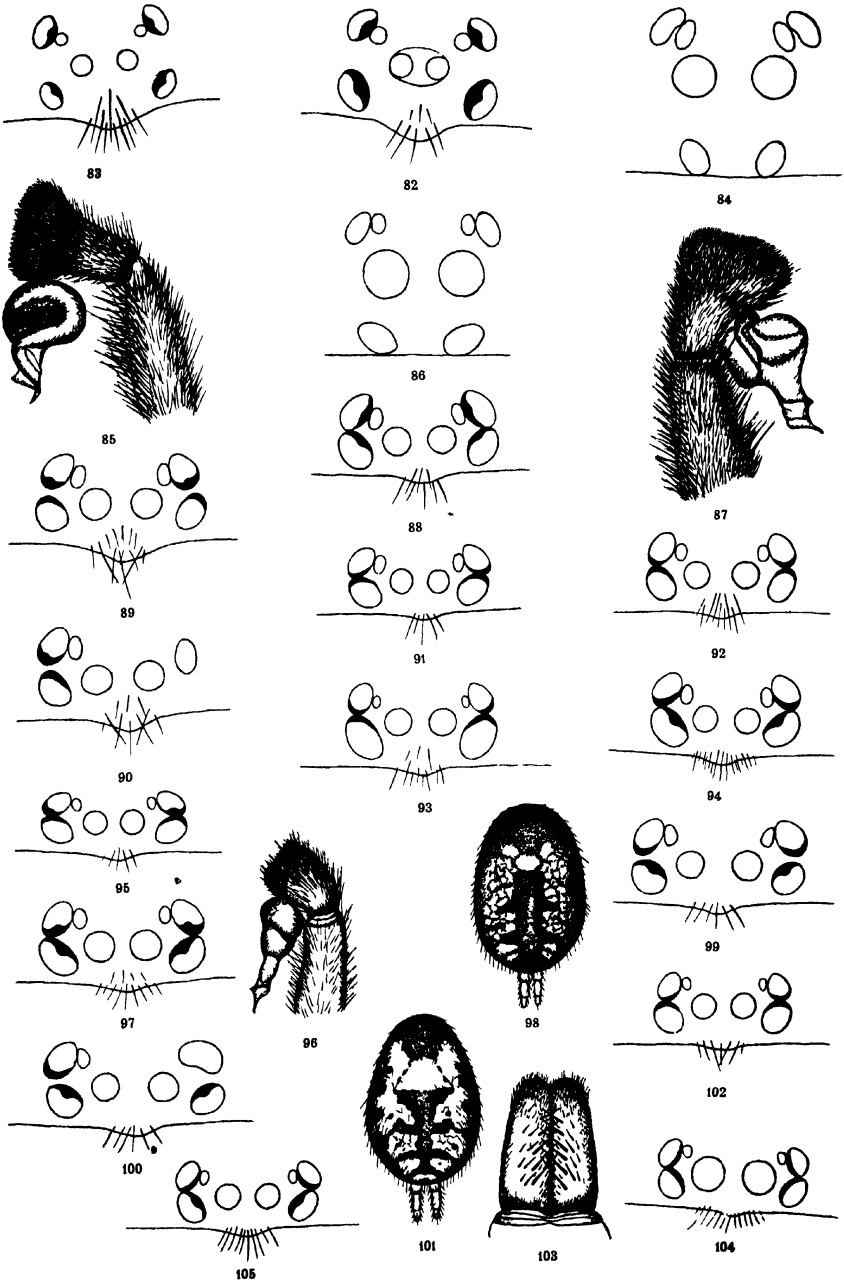
EXPLANATION OF PLATE XXII.

Fig. 57.	<i>Arbanitis gracilis</i> ,	Rainb. and Pull.,	♀, eyes.
" 58.	" "	" "	♀, abdomen.
" 59.	" <i>festivus</i> ,	" "	♀, eyes.
" 60.	" <i>similaris</i> ,	" "	♀, "
" 61.	" <i>pulchellus</i>	" "	♀, "
" 62.	" "	" "	♀, abdomen.
" 63.	" <i>elegans</i> ,	" "	♀, eyes.
" 64.	" <i>hirsutus</i> ,	" "	♀, "
" 65.	" <i>montanus</i>	" "	♂, "
" 66.	" "	" "	♂, apophysis, tibia i.
" 67.	" "	" "	♂, palpus.
" 68.	" "	" "	♀, eyes.
" 69.	" <i>papillosus</i> ,	" "	♀, "
" 70.	" <i>inornatus</i> ,	" "	♀, "
" 71.	<i>Tambouriniana variabilis</i> ,	" "	♀, "
" 72.	<i>Albaniana inornata</i> ,	" "	♀, "
" 73.	" <i>ornata</i> ,	" "	♀, "
" 74.	" "	" "	♀, abdomen.
" 75.	" <i>villosa</i> ,	" "	♀, eyes.
" 76.	" <i>flavomaculata</i> ,	" "	♀, "
" 77.	<i>Bancroftiana speciosa</i> ,	" "	♂, "
" 78.	" "	" "	♂, palpus.
" 79.	<i>Armadalia ornata</i> ,	" "	♀, eyes.
" 80.	" <i>setosa</i> ,	" "	♀, "
" 81.	" <i>zorodes</i> ,	" "	♀, "



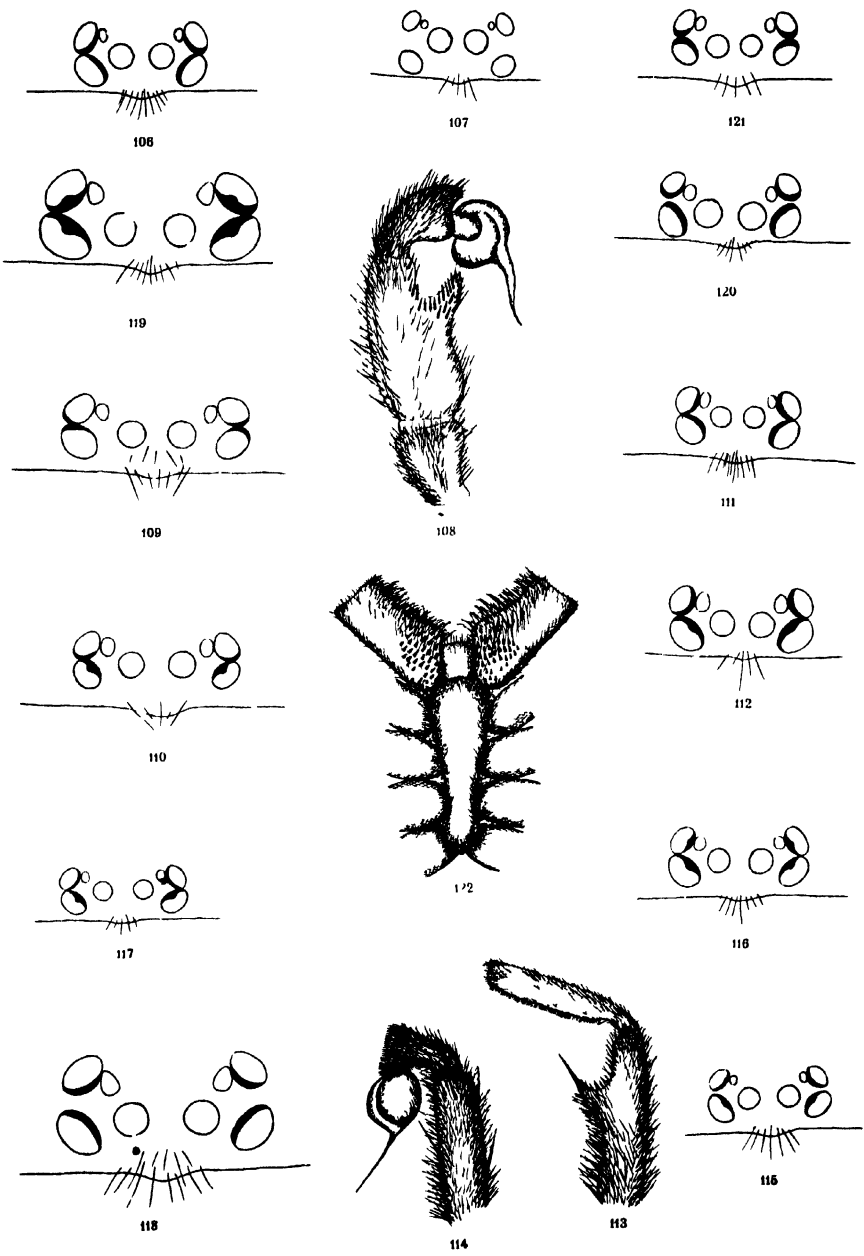
EXPLANATION OF PLATE XXIII.

Fig. 82.	<i>Armadalia pallida</i> ,	Rainb. and Pull.,	♀, eyes.
„ 83.	<i>Cataxia tetrica</i> ,	„	♀, „
„ 84.	<i>Lampropodus scintillans</i>	„	♂, „
„ 85.	„ „	„	♂, palpus.
„ 86.	„ <i>iridescens</i>	„	♂, eyes.
„ 87.	„ „	„	♂, palpus.
„ 88.	<i>Aname villosa</i>	„	♀, eyes.
„ 89.	„ <i>hirsuta</i>	„	♀, „ normal.
„ 90.	„ „	„	♀, „ abnormal.
„ 91.	„ <i>comosa</i>	„	♀, „
„ 92.	„ <i>grandis</i>	„	♀, „
„ 93.	„ <i>aurea</i>	„	♀, „
„ 94.	„ <i>flavomaculata</i>	„	♀, „
„ 95.	„ <i>nebulosa</i>	„	♂, „
„ 96.	„ „	„	♂, palpus.
„ 97.	„ „	„	♀, eyes.
„ 98.	„ „	„	♀, abdomen.
„ 99.	„ <i>decora</i>	„	♀, eyes, normal.
„ 100.	„ „	„	♀, „ abnormal.
„ 101.	„ „	„	♀, abdomen.
„ 102.	„ <i>armigera</i>	„	♀, eyes.
„ 103.	„ „	„	♀, falces.
„ 104.	„ <i>maculata</i>	„	♀, eyes.
„ 105.	„ <i>coenosa</i>	„	♀, „



EXPLANATION OF PLATE XXIV.

Fig. 106.	<i>Aname fuscocincta</i> , Rainb. and Pull., ♀, eyes.
„ 107.	„ <i>pulchra</i> „ „ ♂, „
„ 108.	„ „ „ „ ♂, palpus.
„ 109.	„ <i>robusta</i> „ „ ♀, eyes.
„ 110.	„ <i>confusa</i> „ „ ♀, „
„ 111.	„ <i>intricta</i> „ „ ♀, „
„ 112.	„ <i>butleri</i> „ „ ♀, „
„ 113.	<i>Chenistonia major</i> , Hogg, ♂, tibia i., apophysis.
„ 114.	„ „ „ ♂, palpus.
„ 115.	„ <i>auropilosa</i> , Rainb. and Pull., ♀, eyes.
„ 116.	„ <i>villosa</i> „ „ ♀, „
„ 117.	<i>Ixamatus maculatus</i> „ „ ♀, „
„ 118.	<i>Stanwellia decora</i> „ „ ♀, „
„ 119.	<i>Atrax vallida</i> „ „ ♀, „
„ 120.	<i>Anepsiada ventricosa</i> „ „ ♀, „
„ 121.	<i>Dolichosternum attenuatum</i> „ „ ♀, „
„ 122.	„ „ „ „ „ , sternum and maxillæ.



STUDIES IN AUSTRALIAN FISHES.

No. 5. *

BY

ALLAN R. McCULLOCH, Zoologist, Australian Museum.

(Plates xxv.-xxvi.)

Family TORPEDINIDÆ.

Genus TORPEDO, *Houttuyn*.

Torpedo (*Houttuyn*), Jordan, *Genera of Fishes*, 1917, p. 22.

TORPEDO FAIRCHILD, *Hutton*.

(Plate xxv.)

Torpedo fairchildi, Hutton, *Cat. Fish. N.Z.*, 1872, p. 83, pl. xii., fig. 134.
Id., Robson, *N.Z. Journ. Sci.*, ii., 1886, pp. 27, 123 (breeding).

Torpedo fusca, Parker, *Trans. N.Z. Inst.*, xvi., 1884, p. 281, pl. xxii. *Id.*,
Gascoyne, *Trans. N.Z. Inst.*, xxvii., 1895, p. 672.

Narcacion fairchildi, Waite, *Rec. Cantb. Mus.*, i. 1, 1907, p. 8, and *Loc. cit.*, i. 2, 1909, p. 144, pl. xvii.

Narcacion fusca, Waite, *Loc. cit.*, i. 1, 1907, p. 8.

Narcobatus fairchildi, Waite, *Loc. cit.*, i. 4, 1912, p. 316.

Length of the disc, from the snout to the level of the end of the ventrals, 1·17 in its width; tail from the vent 1·4 in the length of the disc. Narrowest interspiracle width 1·3 in the space between the eyes; width of the spiracle equal to the longitudinal bulge of the eye, and 2·2 in the space between the eyes. Mouth as wide as its distance from the end of the snout; internasal width equal to half the preoral length.

Disc subcircular, somewhat flattened in front, with the snout scarcely distinguished; the posterior angles broadly rounded. Eyes small, their length greater than their distance from the spiracle; they are a little nearer to each other than to the anterior margin of the disc. Spiracles without fringes, subovate and oblique; the interspiracle width much less than the space between the eyes. Each nostril with a free upstanding lobe posteriorly, and a second pointed one overhanging the upper lip; internasal valve subquadrangular, the angles rounded; the posterior margin incised on the median line, where there is a small fleshy tubercle. Teeth in a band in each jaw, with broad bases and sharp upstanding points. Skin everywhere smooth, the lateral line well defined on each side of the back.

The first dorsal fin rounded, the middle of its base above the junction of the ventral fin with the tail; its height, measured from its origin to its

* For No. 4, see "Records," xi., 1917, p. 163.

tip is about one half greater than that of the second dorsal, and is equal to the distance between the outer angles of the spiracles; its hinder edge is a little behind the posterior angles of the ventrals. Second dorsal of similar form to the first, and much nearer it than the tail. Ventrals rounded, a small angular lobe projecting from the claspers. Caudal large, subtruncate, its depth much greater than its length; the peduncle is distinctly keeled laterally, and the vertebral portion does not nearly reach the margin of the fin.

Colour.—Chocolate brown above, white below.

Described and figured from an adult male specimen 470 mm. wide.

Identity.—In identifying this specimen as *T. fairchildi*, I rely upon Waite's description and figure rather than upon the original definition and illustration of the species, which were evidently very faulty. I have also accepted the synonymy as determined by him.

Loc.—This specimen was obtained by the State Trawlers nine miles N. 170° E. of Green Cape, New South Wales, in forty-nine fathoms, from a bottom of sand and stones. It was presented to the Trustees of the Australian Museum by Mr. David G. Stead, General Manager of the State Trawling Industry, to whom I am indebted for the privilege of recording the first species of the genus *Torpedo* recognised from Australian waters.

Family ALBULIDÆ.

Genus ALBULA (*Gronow*), *Scopoli*.

ALBULA VULPES, *Linné*.

Albula conorhynchus, Saville Kent, "Great Barrier Reef," 1893, p. 302.

Albula vulpes, Ogilby, Proc. Roy. Soc. Qld., xxi., 1908, p. 1. *Id.*, Weber and Beaufort, Fish. Indo-Austr. Arch., ii., 1913, p. 7, fig. 5.

Albula glossodonta, Ogilby, Mem. Qld. Mus., v., 1916, p. 96.

A large specimen, 603 mm. long from the snout to the end of the middle caudal rays, was forwarded by the Fisheries Department early in June, 1918, from Woy Woy, near Sydney. Its prevailing colour was a rich pink. It does not differ from two smaller examples from Malekula, New Hebrides, and Hood Bay, Papua. Though recorded from Queensland, this species has not been previously recognised south of Moreton Bay.

Family CLUPEIDÆ.

Genus SARDINIA, *Poey*.

SARDINIA NEOPILCHARDUS, *Steindachner*.

Australian Pilchard.

(Plate xxvi., fig. 1.)

Clupea melanosticta, McCoy, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 188 (not of Schlegel).

Clupea sajar, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 187, and Proc. Linn. Soc. N.S.Wales, iii., 1879, p. 355. *Id.*, Hutton, Cat. Fish. N. Zeal., 1872, p. 63, and Hector, *Ibid.*, p. 119, pl. xi., fig. 110. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, iv., 1879, p. 371, and *Ibid.*, vi., 1882, p. 258. *Id.*, Johnston, Proc. Roy. Soc. Tasm., 1882 (1883), p. 133 and *Ibid.*, 1890 (1891), p. 37. *Id.*, Arthur, Trans. N.Z. Inst., xv., 1883, p. 208, pl. xxxiv., fig. 2. *Id.*, Ogilby, Cat. Fish. N.S. Wales, 1886, p. 56, and Ed. Fish. N.S.Wales, 1893, p. 180, pl. xlv. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 37. *Id.*, Hutton, Trans. N.Z. Inst., xxii., 1890, p. 284, and Index Faun. N.Zeal., 1904, p. 51. *Id.*, Waite, Rec. Cantb. Mus., i, 1907, p. 10. *Id.*, Zietz, Trans. Roy. Soc. S.Austr., xxxii., 1908, p. 294 (not *C. sajar*, Jenyns)

Clupea neopilchardus, Steindachner, Denk. Akad. Wiss. Wien., xli. i., 1879, p. 12. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 416. *Id.*, Waite, Rec. Cantb. Mus., i. 3, 1911, p. 158, and *Ibid.*, i. 4, p. 317.

Clupanodon neopilchardus, Waite, Mem. Austr. Mus., iv. 1, 1899, p. 53, and Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 13, and Rec. Austr. Mus., vi. 1, 1905, p. 58. *Id.*, Stead, Ed. Fish N.S.Wales, 1908, p. 25, pl. iv. *Id.*, McCulloch, Zool. Res. "Endeavour," i. 1, 1911, p. 17.

Amblygaster neopilchardus, Cockerell, Mem. Qld. Mus., iii., 1915, p. 36 (scales). *Id.*, Ogilby, Mem. Qld. Mus., v., 1916, p. 98. *Id.*, Waite, Austr. Antarctic Expt., iii. 1, 1916, pp. 56, 81.

Sardina neopilchardus, Regan, Brit. Antarctic Expt., Zool., i. 4, 1916, p. 136, pl. v., figs. 3-4 (larvae), and Ann. Mag. Nat. Hist. (8), xviii., 1916, p. 14, pl. i., fig. 2.

Br. 7. D. 4 + 14-15; A. 3 + 13-14 + 2; P. 17-18; V. 7-8; C. 19. Forty-nine rows of scales between the operculum and the hypural joint, seventeen on the back before the dorsal fin, and twelve between the dorsal and ventral fins. Vertebrae forty-nine.

Depth 4.9 in the length to the hypural joint; head 3.9 in the same. Breadth behind the head 1.7 in the depth. Eye 4.05 in the head, and 1.3 in the snout, which is 3.1 in the head.

Body moderately elongate, compressed, the ventral profile, more curved than the back. Maxillary broad, rounded posteriorly, reaching to below the anterior third or fourth of the eye, and scarcely attaining the vertical of the anterior border of the pupil; its surface bears two strong ridges, and the upper portion is covered by a broad supplemental bone which is expanded posteriorly. Cheek, between the eye and the anterior end of the preoperculum, as deep as the eye. Cheek, preopercular border, and upper portion of operculum with arborescent mucous canals. Operculum with five or six striæ descending towards the suboperculum. Nostrils supero-lateral, juxtaposed, and nearer the end of the snout than the eye. Upper surface of head flat, with bony ridges, the occiput with two triangular, striate patches. Jaws and palate without teeth. Gill-rakers fine and closely set, the longest equal to the length of the eye; seventy-three on the lower limb of the first arch.

Scales¹ deciduous, largest on the sides, becoming smaller backwards. Ventral scutes keeled, but not prominent; about nineteen before the ventral fins, and about fifteen more to the vent. Elongate scales cover the bases of the dorsal, anal, pectoral and ventral fins; two enlarged, leaf-like scales on each side of the caudal.

Origin of the dorsal fin a little nearer the snout than the last ray is to the hypural joint. Fourth and fifth dorsal rays longest, slightly longer than the base of the fin; the others decrease rapidly backwards, and the margin of the fin is slightly concave. Ventrals inserted below or a little behind the middle of the dorsal. Pectoral inserted below the angle of the suboperculum, its upper rays longest, reaching about three-fourths of its distance from the vertical of the first dorsal ray. Third and fourth anal rays longest, the others decreasing backwards to the penultimate which, with the last, is enlarged. Caudal deeply forked.

Colour.—Dark blue above, changing abruptly into the silver of the sides. Each scale of the back with a small blackish basal spot, and a row of round blackish spots along the junction of the blue with the silver. Tips of jaws blackish. Eye silvery. Dorsal and caudal fins tipped with blackish dots.

Described from six specimens taken from a large shoal which entered Botany Bay in the middle of July, 1917. They were secured at Sandringham by Mr. J. H. Wright, and are of about equal size. The specimen figured is 190 mm. long.

Occurrence.—Pilchards occur in vast shoals on the coast of New South Wales in the colder months, but very little definite information relative to their habits and migrations is available. The following remarks are collected from various papers published in Victoria, New South Wales and New Zealand.

McCoy² recorded the occurrence of Pilchards in Hobsons Bay, Victoria, in August, 1864-1866. They arrived in such countless numbers in the latter year, that carts were filled with them by simply dipping them out of the sea with large baskets. Hundreds of tons of the fish were sent to the inland Victorian markets, and they were sold in Melbourne for several weeks by the bucket-full for a few pence. Captains of ships entering Hobson's Bay, reported having passed through shoals of Pilchards for miles. Ogilby (1893) noted that Pilchards annually pass along the New South Wales coast in incredible multitudes. Macleay (1879) ascertained from the fishermen that their annual visit to the New South Wales coast was about June and July, when enormous shoals were generally observed one to three miles from the land, and migrating northwards. According to Stead (1908) shoals of mature Pilchards, nine to ten inches long, are usually making northward along the New South Wales coast in September, and small bodies of them are often found among Mackerel of equal size and *vice versa*.

The Pilchard is equally abundant in New Zealand waters. Arthur (1883) records that they occur all the year round at Queen Charlotte Sound, but only enter the shallower bays during winter. They prefer

¹ Scales described by Cockerell—Mem. Qld. Mus., iii., 1915, p. 36.

² McCoy—Intercolonial Exhibition Essays, 1866-1867, p. 319.

colder water, and so leave the shallows when the spring sets in. In winter, they occur in large shoals, when they are systematically fished for, but they keep apart during the summer. Four smoke-houses were employed in curing the fish in 1882, and the average haul of the nets was one-and-a-half to two tons, but at times, hauls of ten tons were secured. Henry³ obtained half a baker's basket full of Pilchards at Queenscliff, New Zealand, in 1902, by simply dipping it in the water. The air was alive with birds, and the water with porpoises and various fishes preying upon the pilchards. Hector (1872) recorded a shoal migrating southwards east of Otago, New Zealand, which extended as far as the eye could reach. It was followed by a multitude of Gulls, Mutton-birds, Barracouta and Porpoises, and the fish were so densely packed that a pitcher might be half-filled with them by simply dipping it in the sea.

Notwithstanding their great abundance, and value as food, Pilchards are rarely seen in the markets in Australia. Ogilby (1893) noted that the number observed in the markets over a space of eight years could be counted on the fingers of one hand. Stead⁴, also speaking with experience of our markets, remarked that with the exception of an occasional basket or two of Pilchards, offered as bait rather than for human consumption, this fish does not usually pay toll. On one occasion, however, in 1908, about forty baskets-full were netted, and after being salted and smoked, were readily sold.

As food.—According to Arthur (1883) the New Zealand Pilchard is exceedingly good when fried, and is sold when smoked as the "Picton Herring." Stead (1908) states that they smoke well, and a small quantity is so treated annually in New South Wales. Some which were captured with those described above, were found to be quite good eating, but with a tendency to quickly become rather soft.

Breeding.—Nothing definite appears to have been recorded relative to the reproduction of the Pilchard in Australian waters. According to Arthur (1883), they spawn during the summer in New Zealand, and are always very full of roe about Christmas time, when they are found in small shoals. Larval specimens, 12-18 mm. long, have been described and figured by Regan (1916). These were collected near North Cape, New Zealand at a depth of three metres, on 1st September, 1911.

Common Names.—This fish is generally recognised as the Pilchard or Sardine. Macleay noted that the fishermen near Sydney called it "Maray," a name also applied to other species of Herrings, while it is sold in New Zealand in the smoked state as "Picton Herring."

Range.—On the eastern coast of Australia, the Pilchard ranges from Tasmania (Johnston, 1882) northwards to Moreton Bay and Hervey Bay, Queensland (Ogilby, 1916). Zietz (1908) included it in a list of South Australian fishes, and Waite (1905) recorded Western Australian specimens. It ranges from north to south in New Zealand, being observed at Auckland (Sherrin, 1886), and recorded from the Auckland Islands by Waite (1916).

³ Henry—Trans. N. Zeal. Inst., xxxiv., 1902, p. 570.

⁴ Stead—Future of Commercial Marine Fishing in N.S.Wales (p. 17). N.S.Wales Fisheries Department, Pamphlet, 1911.

Family STROMATEIDAE.

Genus CENTROLOPHUS, *Lacépède*.CENTROLOPHUS MAORICUS, *Ogilby*.

(Plate xxvi., fig. 2.)

Centrolophus maoricus, Ogilby, Rec. Austr. Mus., ii. 5, 1893, p. 64. *Id.*, Regan, Ann. Mag. Nat. Hist. (7), x., 1902, p. 195, and Brit. Antarctic Exped., Zool. i. 1, 1914, p. 19, and i. 4, 1916, p. 144, pl. x., fig. 7 (post larva).

D. 39; A. 25; P. 20; V. $i/5$; C. 17. One hundred and sixty or more rows of scales below the lateral line between the operculum and the base of the tail.

Depth below the highest dorsal rays 4.08 in the length from the snout to the base of the tail; head 4.5 in the same. Eye slightly shorter than the snout, 4.2 in the head. Interorbital width a little greater than the length of the snout, which is 4 in the head. Longest dorsal and anal rays about 2.5, pectoral 1.7, and ventral 3 in the head.

Body compressed, the upper profile less arched than the lower. Snout obtusely rounded, the upper profile of the head a little oblique, its junction with the neck defined by a slight prominence. Nostrils approximate, in the anterior third of the snout; the anterior rounded and slightly larger than the posterior, which is oval. Eye large, vertically elliptical, and surrounded by a prominent naked lid. Mouth oblique, the maxilla reaching to below the anterior portion of the eye. Teeth cardiform, in a single row in each jaw, but irregular and almost biserial in the anterior portion of the premaxillaries; palate and tongue toothless. Gill-rakers massive, flat, with setiform spines on their hinder margins; thirteen on the lower limb of the first arch, the length of the posterior almost equal to half the width of the eye. Margins of the preoperculum, suboperculum and interoperculum membranaceous and finely lobulate.

Scales cover the greater part of the operculum, interoperculum and suboperculum; the rest of the head is naked and closely pitted with minute pores. The scales commence abruptly on the nape, and extend over the greater part of the vertical fins and onto the base of the pectorals. They are cycloid and concentrically striated; where they are removed, their pits often show a median pore. Lateral line extending backward horizontally for a short distance, thence dipping towards the middle of the body, which is reached above the origin of the anal fin.

Dorsal fin originating above the end of the pectoral fin, its anterior rays deeply imbedded in the skin and difficult to distinguish; they increase gradually in length to the eleventh, which, with a few following it, form a slightly elevated lobe to the fin; the rays then decrease gradually in length backwards so that the margin of the fin is almost straight. Anal of similar form to the dorsal, the length of its base about once and two-thirds in that of the dorsal; the last ray is well behind that of the dorsal. Caudal deeply emarginate, its lobes pointed. Ventrals small, inserted before the vertical of the pectoral base; the spine is weak, and the last ray is united to the abdomen by membrane.

Colour.—Dark slatey-brown above, gradually changing to leaden-silver below. Head brown above, leaden-silver on the sides. Vertical fins similar to the body; outer sides of the ventrals and pectorals lighter.

Described and figured from a specimen 740 mm. long from the snout to the end of the middle caudal rays. It differs from Ogilby's description in several characters, but a comparison of it with the holotype of the species, which is stuffed in the Australian Museum collection, shows it to be similar in all details.

Loc.—This specimen was found washed up on a beach at the entrance to Crookhaven, New South Wales. It was slightly damaged, parts of the eye and caudal peduncle having been eaten away, but was otherwise in splendid condition. The specimen was presented to the Trustees of the Australian Museum by the Fisheries Department of New South Wales.

No species of the genus *Centrolophus* has hitherto been recognised from Australian waters.

Family SYNANCEJIDÆ.

Genus *EROSA*, *Swainson*.

EROSA EROSA, *Langsdorf*.

Erosa erosa (Langsdorf), Jordan and Starks, Proc. U.S. Nat. Mus., xxvii. 1904, p. 156, fig. 16.

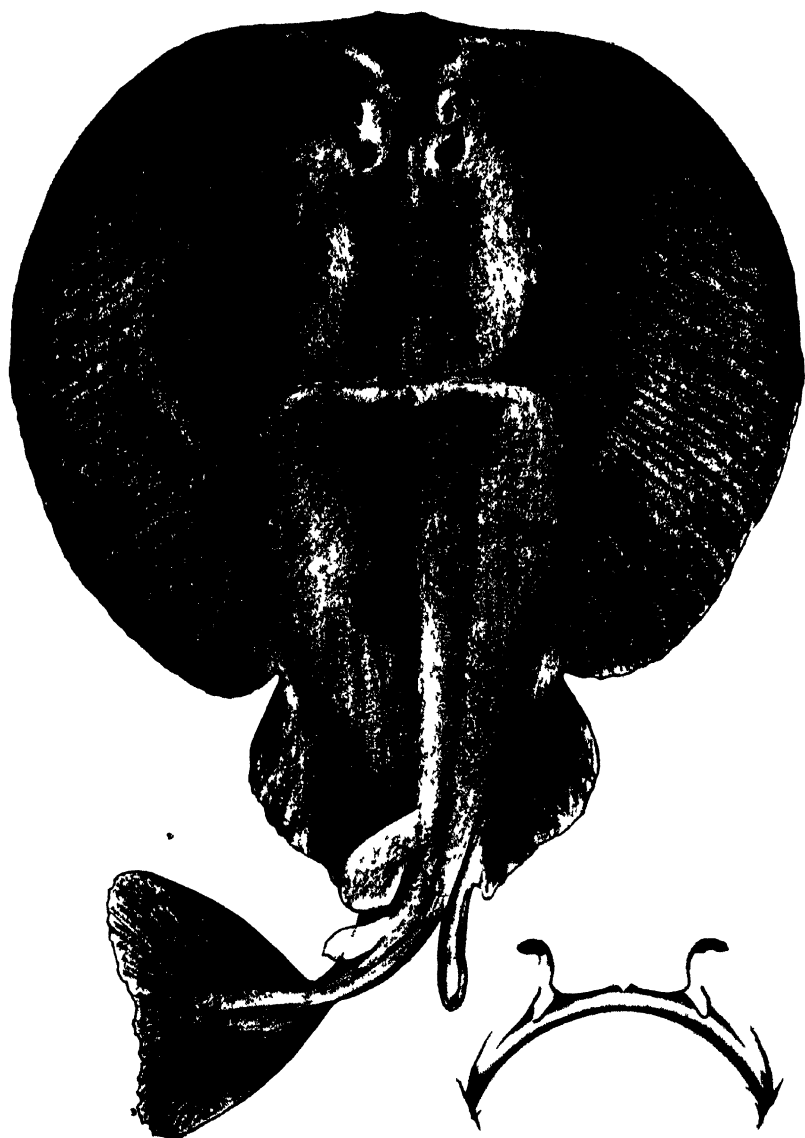
Erosa iridea, Ogilby, New Fish. Qld. Coast, 1910, p. 113.

Having compared the type of *E. iridea*, which is 80 mm. long, with a small Japanese example of *E. erosa*, 46 mm. long, I find no differences other than small details of the cephalic structure, which are evidently due to the very different sizes of the specimens.

Loc.—Nineteen miles N. 30° W. from Double Island Point, Queensland; 33 fathoms.

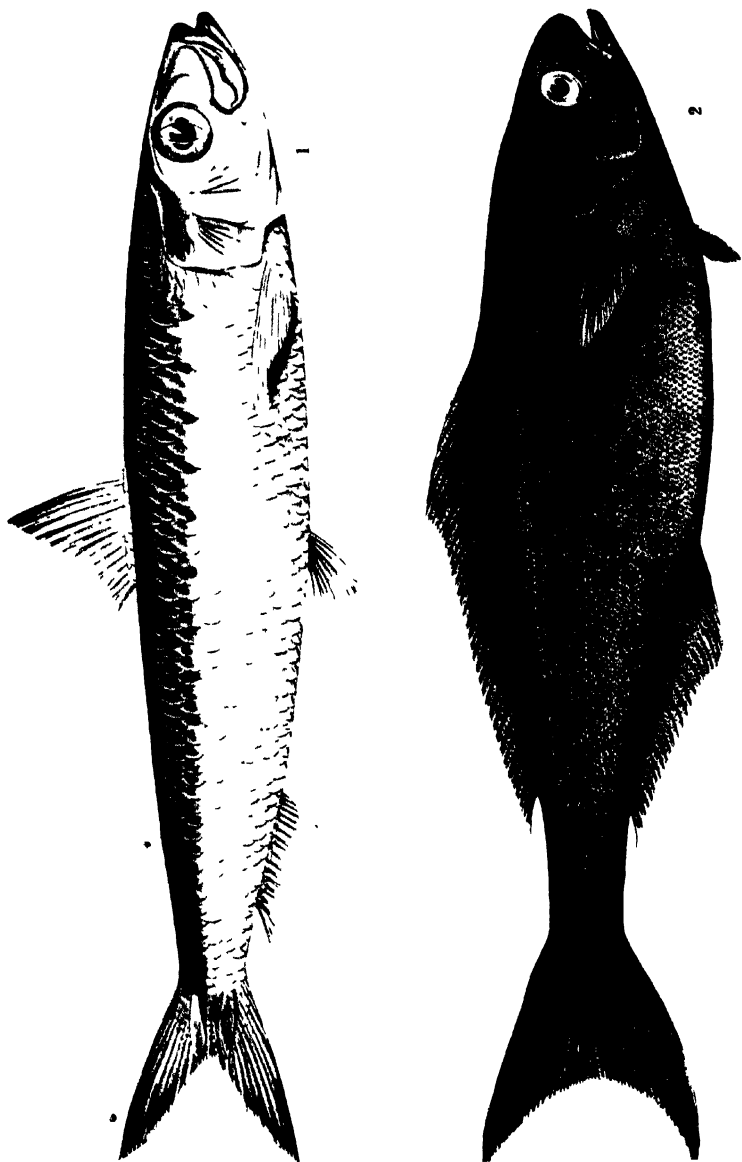
EXPLANATION OF PLATE XXV.

Torpedo fairchildi, Hutton. A specimen 470 mm. wide, from off Green
Cape, New South Wales.



EXPLANATION OF PLATE XXVI.

- Fig. 1. *Sardinia neopilchardus*, Steindachner. A specimen 190 mm. long, from Botany Bay, New South Wales.
- Fig. 2. *Centrolophus maoricus*, Ogilby. A specimen 740 mm. long, from Crookhaven, New South Wales.



AN ANCIENT EGYPTIAN COFFIN IN THE AUSTRALIAN MUSEUM.

Translations and Explanations of the Hieroglyphs .

BY

A. ROWE

(Lecturer on Archaeology for the Workers' Educational Association, Adelaide, and author of "Guide to Egyptian Antiquities in South Australian Museum.")

(Plate xxvii.)

One of the most interesting and valuable objects in the Archaeological Collection of the Australian Museum, Sydney, is undoubtedly the wooden box-shaped ancient Egyptian coffin which was found some few years ago, in a tomb, at a place in Upper Egypt called Beni-Hasan. According to the printed descriptive label attached to the glass containing case, it seems that when the tomb was opened up it was discovered that the grave had been rifled and the mummy removed from the coffin. It is quite possible that the latter itself has suffered somewhat as the result of the depredations of the unknown thieves, for the inscriptions and paintings are in a rather poor state of preservation; indeed, in some instances, the hieroglyphs are entirely obliterated.

The style of the coffin shows us that we can date it to the 12th Dynasty, that is to say, to somewhere about 2,300 B.C., at which time Amen-em-hat III. was the ruler of Egypt. This king carried out large irrigation works in connection with the great natural reservoir in the Fayyum, which was known to the Greeks as Lake Moeris. He is also thought to have built the Labyrinth, which the old historian Herodotus says contained twelve courts, and three thousand chambers, one thousand five hundred above ground and one thousand five hundred under ground, and covered an area about 1,000 feet long and 800 feet broad; this huge building was dedicated to the crocodile-god Sebek, and many sacred crocodiles were buried in a place specially set apart for them.

At the early date of which we are speaking the great Babylonian Empire had not been founded; the whole of Europe—with the exception, perhaps, of the isles of Cyprus and Crete, which were in the Early Bronze Age—was in the Stone Age culture; while the great Aryan influx from west central Asia did not take place for at least another two hundred years. The Hebrews, themselves, must have been simply wandering tribes living in Bedawin fashion amid the vast sandy wastes of Northern Mesopotamia, where they possibly originated, and worshipping the tribal god Yaweh, whom, at a later date, they identified with the God of the Universe. As a matter of fact, it is generally held that it was not until the time of Khammurabi, a king of the First Babylonian Dynasty (about B.C. 2,000) that the traditional tribal leader Abraham led the Hebrews down from Northern Mesopotamia, through Syria, where he defeated the five kings, to Southern Canaan.

Although more than four thousand years have passed away since the inscriptions and paintings were executed on the coffin sides and lid, yet we are able to read nearly all the texts and to learn the name of the person for whom the case was made. The hieroglyphs, which comprise several hundreds of curious signs—gods, men, birds, animals, and various animate and inanimate objects—contain prayers to the gods of the Other World for sepulchral offerings and felicity in the "Fields of Peace." These prayers belong to the oldest form of the "Book of the Dead," or Ancient Egyptian Funeral Liturgy, which we term the Heliopolitan Recension (on account of its being promulgated by the priests of Heliopolis, the On of the Old Testament) to distinguish it from the later Theban and Saite Recensions. The object of all the ceremonies and formulæ contained in the "Book of the Dead" was to endow the dead body with power to resist corruption, and to ensure it a renewed and beatified existence with the gods.

The deceased's name, which appears in several places on the coffin, is Neter-Nekht; he was the son of some person the latter part of whose name, . . . ti, only can be read due to the fact of certain hieroglyphs being obliterated. According to the Museum's descriptive label one reads that Neter-Nekht (i.e., "Strong in god") was the son of "Hetep," but from a close examination of what remains of the signs for the name in question, the present writer has no hesitation in saying that this rendering is hardly correct.

Neter-Nekht was a "mer ahēt" or "Overseer of Farm Lands," which was a very important office in ancient Nilotic days.

For the sake of clearness, and in order that the reader, if he so desires, may be able to compare the inscriptions drawn in plate, with those painted on the coffin, each side of the case will be treated separately. The numbers in the following text refer to the numbers on the plate.

The Coffin of Neter-Nekht.

Southern end:—This contains three separate lines of texts, which read as follows:—*Horizontal text*—(1) "The devotee before Isis, whose word is right and true." *Perpendicular texts*—(2) "Devotee before Serqet, Neter-Nekht"; (3) "Devotee before the Little Company of Gods, Neter-Nekht."

Explanations—Line (1) Isis was one of the greatest of all the Egyptian goddesses; she was the wife of Osiris, the supreme judge of the dead, and is usually depicted as a woman, with a head-dress in the form of a seat, the value of the hieroglyph for which forms her name. (2) Serqet was a scorpion-goddess. (3) At Heliopolis, the priests proclaimed the existence of three Companies of the gods; the first Company was called the "Great," the second the "Little," and the third had no special title: these Companies represented the gods of heaven, earth and Other World respectively. The "Little Company of Gods" which is mentioned on the end of the coffin under review was formed of eleven deities.

Northern end:—This end also contains three lines of texts:—*Horizontal text*—(4) "The devotee before Nephthys." *Perpendicular texts*—

(5) "The devotee before the Great Company of Gods, Neter-Nekht, whose word is right and true;" (6) "The devotee before Neith, Neter-Nekht."

Explanations—(4) Nephthys, another great goddess of the Other World, was the sister of Osiris and Isis. (5) The "Great Company of Gods" consisted of between ten to thirteen deities. (6) Neith personified the place in the sky where the sun rises. In one form she was the goddess of the loom and shuttle, and also of the chase, while in another aspect she appears in the likeness of a cow.

Lid:—This contains a single line of hieroglyphs which reads:—(7) "May the king give an offering! The god Anubis, the lord of the town of Sepa, the dweller in the divine house; may he grant that thou may traverse heaven, and that thou may be united to (*i.e.*, arrive at) the double-staircase of the Great God, the lord of heaven, O Neter-Nekht, son of ... ti."

Explanations—(7) The words "May the king give an offering" are written at the commencement of most ancient Egyptian sepulchral inscriptions. When we recollect that the king was considered a god, and worshipped as such, we are not surprised when we read that every pious Egyptian prayed to him for an offering, just as he prayed to Osiris and Ra, or to the other deities who dwelt in heaven. Anubis, who was a god in jackal-form, presided over embalmment ceremonies; the phrase "divine house" doubtless refers to the tomb-chamber wherein the god was supposed to dwell. The "great god, the lord of heaven" was Osiris, who was believed to sit on a throne at the top of a flight of stairs.

Western end:—This contains one horizontal line and four perpendicular lines of text:—*Horizontal text*—(8) "May grant a royal offering Anubis, he who is upon his hill, the dweller in the mummy chamber, the lord of the Holy Land, and a beautiful burial in the Mountain of the West [so that] he (*i.e.*, the deceased), may journey in peace, in peace, to his tomb-chamber in Neter-Kher. Neter-Nekht." *Perpendicular texts*—(9) "Devotee before Hapi, Neter-Nekht;" (10) "Devotee before Geb, Neter-Nekht;" (11) "Devotee before Nut, Neter-Nekht;" (12) "Devotee before Qebhsennuf, Neter-Nekht."

Explanations—(8) The god Anubis has already been described. The "Mountain of the West" was a common name for the whole region containing the abode of the dead, which was situated in the high hills on the western bank of the Nile. "Neter-Kher" was the name for the cemetery itself; it means, literally, "Divine Subterranean Place." (9) Hapi, a dog-headed god, protected the small intestines of the deceased which were removed in the process of embalmment. (10) Geb, a goose-shaped deity, was the god of the earth. (11) Nut was the great goddess of the sky. (12) Qebhsennuf, a hawk-headed deity, protected the liver and gall bladder of the deceased.

Eastern end:—One horizontal line and four perpendicular lines of text:—*Horizontal text*—(13) "May the king give an offering; and Osiris, the lord of the town of Busiris, the great god, the lord of the town of Abydos, may he grant sepulchral offerings of cakes and ale, oxen and geese,

linen garments, incense, oil, and everything beautiful, to the overseer of the farm-lands, Neter-Nekht." *Perpendicular texts*—(14) "Devotee before Amseth, Neter-Nekht;" (15) "Devotee before Shu, Neter-Nekht;" (16) "Devotee before Tefnut, Neter-Nekht;" (17) "Devotee before Duamutef, Neter-Nekht."

Explanations—(13) This line needs no discussion. (14) Amseth, a man-headed god, protected the stomach and large intestines. (15) Shu was the god of light, and of dryness; he may be compared to the Atlas of classical writers, and is often depicted as a crouching man supporting the disk of the sun on his shoulders. (16) Tefnut was the twin sister of Shu; she represented in one form moisture and in another form the power of sunlight. This goddess kept thirst away from the dead. (17) Duamutef, a jackal-headed god, looked after the lungs and heart.

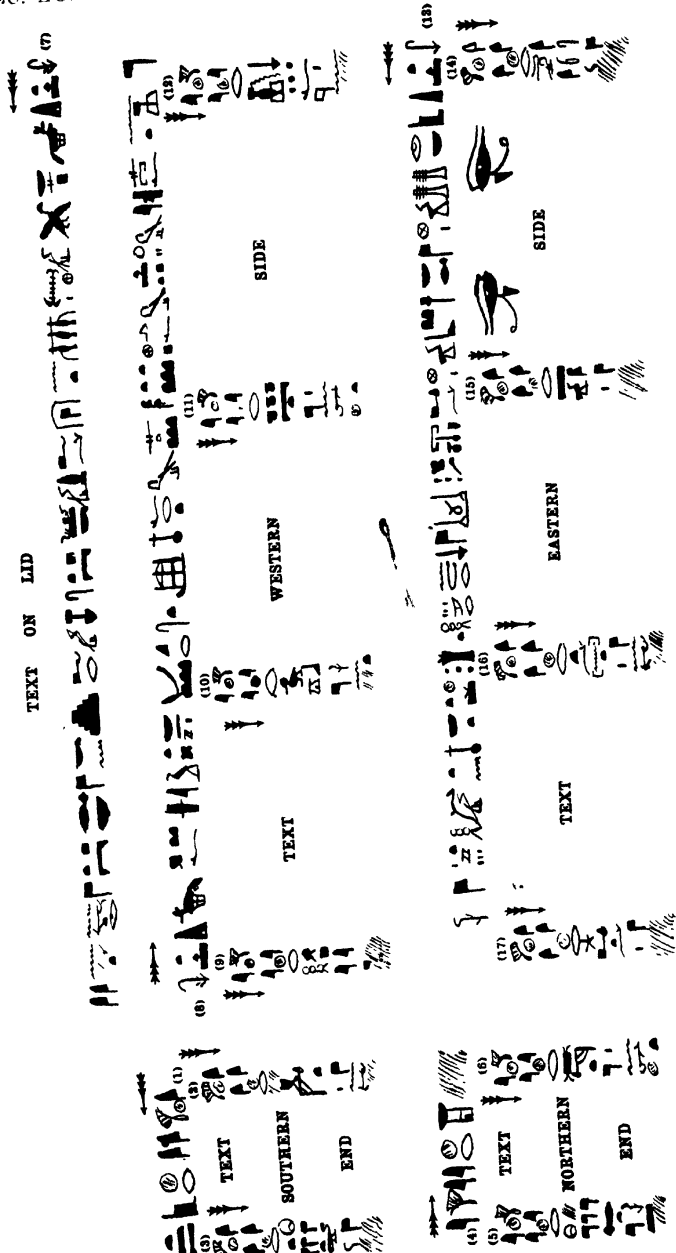
Between the first two perpendicular lines of text (Nos. 14 and 15) on the eastern end of the coffin are painted two sacred eyes, and when the mummy was placed in the coffin its face was turned towards these, as it was believed that the deceased would then be able to gaze out of his case and watch the priest making the periodical offerings in the tomb-chamber. Underneath the eyes is depicted a bolted and barred door which is supposed to represent that of a tomb-chamber of the earliest period.

Translations of lines numbered 7, 8 and 13, respectively, in this article, have already been given by another scholar, as will be seen from the descriptive card in the case, but in certain instances the present writer has ventured to depart from the official readings where he believes that the true values of the hieroglyphs warrant such. The texts shown on the plate were copied from the coffin by the kind authority of the Director of the Australian Museum.

[The Coffin described by Mr. Rowe is six feet two inches in length, by sixteen inches broad, and in depth one foot ten and three-quarter inches; the bottom is wanting. It was disinterred at Beni-Hasan, Upper Egypt, and obtained through the instrumentality of Mr. John Garstang, of the Department of Egyptian Archaeology in the University of Liverpool, England.—(Editor)].

EXPLANATION OF PLATE XXVII.

Hieroglyphic texts from the Ancient Egyptian Coffin of "Neter-Nekht,"
(12th Dynasty, B.C. 2300), in the Australian Museum.



The arrow  indicates the direction in which each line of text reads

THIS COFFIN CAME FROM BENI-HASAN. MIDDLE EGYPT.

PALÆONTOLOGIA NOVÆ CAMBRIÆ MERIDIONALIS—
OCCASIONAL DESCRIPTIONS OF NEW SOUTH WALES
FOSSILS—No. 7.¹

BY

R. EIDERIDGE, Junr., Director and Curator.

(Plates xxviii.-xxx.)

PERMO-CARBONIFEROUS MOLLUSCA.

I.—*Genus* *Dielasma*, *King*, 1861.

(Proc. Dublin Zool. Bot. Assoc., i., 1861, p. 256.)²

Dielasma jervisensis, *sp. nov.*

(Plate xxviii., fig. 4.)

Sp. Chars.—Brachial valve broad-oval, of low even convexity; margins well and evenly rounded, presenting all but a circular circumference; dental sockets small and elongate; crura in all probability short (represented by their bases only); muscular platform well developed occupying exactly one-third the length of the valve, triangular wedge-shaped; regular concentric laminæ of growth, unevenly spaced apart.

Obs.—This is undoubtedly a very uncommon form of the genus, the broad, low-convex surface, and the almost circular outline distinguish this internal cast of a brachial valve from any other *Dielasma* occurring in our Permo-Carboniferous rocks.

Loc.—Cabbage Tree, ten miles from Jervis Bay, Shoalhaven (*R. Barnes*).

Hor.—Upper Marine Series.

Dielasma inversa, *de Koninck*, *sp.*

(Plate xxix., fig. 3 and 4.)

Rhynchonella inversa, *de Koninck*, *Pal. Foss. Nouv. Galles du Sud*, 1877, pt. 3, p. 82, pl. xi., figs. 11, 11a and b.

Dielasma inversa, *Eth. fil.*, *Rec. Geol. Survey N.S. Wales*, v., pt. 4, 1898, p. 175, pl. xix., figs. 1-13.

Obs.—Two specimens, but neither perfect, are figured to illustrate the size to which this remarkable shell attained, and the variability of the folds of the brachial valve, when compared with the largest figure given

¹ Continued from Vol. xi., p. 219.

² *Tests* Marshall, *Nomenclator*, 1873, p. 113. In two previous publications, at least, *Geology* and *Pal. Q'land*, 1892, p. 225, and *Bull. Geol. Survey W. Austr.*, No. 27, 1907, p. 19, I gave an incorrect generic reference to *King's* genus.

either by de Koninck or myself. The lateral folds are always conspicuous in median sized specimens, less marked in young examples, but in large individuals it may be either the one or the other. In Fig. 3, the lateral folds are hardly perceptible, whereas in Fig. 4, they are decidedly pronounced. *D. inversa* and *D. cymbceformis*, Morris, appear to be close allies.

Loc.—Wollongong (*W. S. Dun*).

Hor.—Upper Marine Series. *D. inversa* also occurs in the Lower Marine Series at Harper's Hill, near Allandale, West Maitland District.

II.—Genus *Martiniopsis*, Waagen, 1883.

(Salt Range Foss. (Pal. Indica), i., pt. iv., fas. 2, 1883, p. 524.)

Martiniopsis strzelecki, de Koninck.

(Plate xxviii., fig. 1.)

Martiniopsis strzelecki, de Koninck, Foss. Pal. Nouv. Galles du Sud, pt. 3, 1877, p. 97, pl. xiii., figs. 1, 1a.

Obs.—The very marked slits left by the dental supporting plates in the pedicle valve and the equally well developed septal plates in the brachial valve, and which combined tend to distinguish *Martiniopsis* from *Spirifera*, clearly indicate this species as a member of the former. The fold is remarkably large and produced as compared with the cast figure of the brachial valve given by de Koninck, and is rather an apt illustration of the great variability that occurs in most of our Permo-Carboniferous members of the Spiriferidæ.

The fossil represented in Pl. xxviii., fig. 1, I regard as an extreme variety of those internal casts called by de Koninck *Spirifer strzelecki*. I restrict my remarks to the internal casts, because it has still to be shown that the testiferous example, figured under the same name, and the cast are one and the same species.

Attention does not appear to have been called to the remarkable divergence of the Australian *Martiniopses* in form and other external characters from the typical species described by Dr. Waagen. Had it not been for his hint of the possible generic affinity of some of our species, then known simply as *Spirifera*, it is more than probable that the relationship would have been overlooked. The form and external appearance of the Indian and Australian shells are respectively so very unlike, that were it not for the internal similarity of structure one would be tempted to separate them.

Martiniopsis, as constituted by Waagen, was defined as comprising "more or less globular, or thick lenticular, smooth" punctate shells. None of our species are globular, the nearest approach being *M. oviformis*, McCoy, and all are more or less costate, least apparent, however, in *M. subradiata* (s.s.). The thick lenticular form may perhaps be found in *M. subradiata*, var. *transversa*, mihi.³ The species most commonly met with

³ Etheridge—Geol. Pal. Q'land, etc., 1892, p. 239.

in a testiferous condition is *M. subradiata*, in the Gerringong beds, and although I have examined a very large number of examples, I have not observed a perforated test, from the locality in question. It would appear as if some layers of the test were fibrous, others punctate, hence I used the term "punctate-fibrous."⁴ Waagen wrote:—"The shell is coated with an epidermis, which exhibits a very distinct punctation . . . The median shell layers show this punctation less distinctly, though it can be well observed in places." No Australian *Martiniopsis*, passing through my hands, has been sufficiently well preserved testiferally to exhibit an epidermis, but in examples from Greta (Upper Marine Series), which often have the test in a fairly good state of preservation, there is visible on the exteriors a remarkably delicate and fine, longitudinal, tear-like sculpture (Pl. xxviii., figs. 2-3), which may be of an epidermal nature, but it is not accompanied by perforations,⁵ so far as I can see.

If my determination of the subject of Pl. xxviii., fig. 1, as *Spirifer strzelecki*, de Kon., be correct, then this species certainly becomes a *Martiniopsis*, as we are accustomed to view the genus, although in outward appearance it departs more than usual from the form of the Indian shells. It is pauciradiate, with only two costæ on either side of the fold, and a possible indication of a third.

The original of Pl. xxviii., fig. 1, is in the Berry School of Arts, and was obligingly lent to me by the then Hon. Curator, Mr. T. R. Lewers.

Loc.—Nowra Hill, Shoalhaven, Illawarra District.

Hon.—Upper Marine Series

Martiniopsis subradiata, var.

braxtonensis, var. nov.

(Pl. xxviii., figs. 5 and 6, and Pl. xxix., figs. 1 and 2.)

Obs.—A very remarkable development of our characteristic Permian-Carboniferous *Martiniopsis subradiata* occurs in both the Upper and Lower Marine Series of the Maitland District.

The fossils are always in the condition of limonitic (internal) casts, or kernels, and whilst representing more than one of the larger varieties of *M. subradiata*, they are invariably small, but at the same time there is amongst them a wonderful general uniformity in size. This is one of the outstanding features, although there are, here and there, specimens of larger examples of *M. subradiata*. These Brachiopods are not the only organisms of both the Lower and Upper Marine beds, at Farley and Braxton, in this dwarfed condition, a phenomenon it is difficult to account for other than on the supposition that glacial conditions known to have existed at, or about, the time of the deposition of the strata in question were conducive to it.

Amongst the casts are examples of the equivalents of the following varieties of *M. subradiata* proper:—

⁴ Etheridge—Geol. Pal. Q'land, etc., 1892, p. 238.

⁵ Perforations were observed by Morris.

- a. Non-plicate, almost smooth casts, a condition seen in examples from Gerringong Cliffs, as figured by Morris.⁶ (Pl. xxviii., figs. 5 and 6).
- b. Laterally uni-plicate, similar to an illustration by de Koninck.⁷
- c. Laterally bi-plicate, answering to the var. *darwini*, mihi.⁸
- d. Nulteradiate laterally (Pl. xxx., fig. 2).
- e. Transversely-oblong, similar to var. *transversa*, mihi.⁹

I have catalogued these five varieties all as var. *braxtonensis*, rather than attempt to attach the existing varietal names of the mature-form, the characters so running into one another at times that differentiation is difficult.

The surfaces of many of these casts show pittings and short groovings without and around the muscular impressions; they appear to be confined to these areas and are probably connected with the ovarian systems.

Locs.—Farley Railway Cutting at Farley, and Braxton, Hunter River District.

Hors.—Lower and Upper Marine Series respectively.

III.—*Genus Mæonia*, Dana, 1847.¹⁰

(American Journ. Sci. (2), iv., 1847, p. 158).

Mæonia morrisii, *sp. nov.*

(Plate xxviii., figs. 7 and 8.)

Sp. Chars.—Shell (internal cast), short, gibbous, the valves strongly arched diagonally; anterior ends convex between the boldly rounded margins and the median, oblique, open cinctures, which strongly insinuate the ventral margins; posterior ends comprising nearly two-thirds of each valve, rising gradually to the cord-like, prominent, slightly sigmoidal diagonal ridges; posterior slopes large, slightly concave, and each medianally traversed by a subsidiary diagonal ridge following the outline of its principal; when viewed posteriorly, the united posterior slopes bounded by the cord-like diagonal keels present a strongly cordiform outline; anterior muscular scars quite marginal, elongately triangular in a longitudinal direction, and concentrically ridged; posterior scars oval, rather retired from the posterior margins.

Obs.—This remarkable shell was brought to my notice by Mr. W. S. Dun; it is from Harper's Hill, and is clearly of the type of *Mæonia carinata*, Morris, but much shorter, and in comparison with the latter far wider across the united valves. The diagonal keels are very prominent and the posterior slopes so far flattened, or slightly concave, that when viewed

⁶ Morris—Strzelecki's Phys. Descrip. N.S. Wales, etc., 1845, pl. xvi., fig. 1.

⁷ de Koninck—Foss. Pal. Nouv. Galles du Sud, pt. 2, 1876, pl. xii., fig. 1.

⁸ Etheridge—Geol. Pal. Q'land, etc., 1892, p. 240.

⁹ de Koninck—*Loc. cit.*, pl. xii., fig. 1b.

¹⁰ As *Myonia*.

end-on the resemblance to the posterior end of a *Conocardium*, with its siphonal tube removed is striking.

In the present instance we are either dealing with a very remarkable variety of *Mæonia carinata*, or a quite new form. The difficulty of arriving at a satisfactory conclusion on this point arises from the fact that examples of *M. carinata* so seldom display the true outline of the species, but are usually met with as more or less crushed or distorted casts.

I rely on the following features for the specific stability of this shell:—(1) short form and gibbosity as compared with length; (2) very marked median cinctures; (3) remarkably prominent cord-like diagonal keels; (4) markedly cordiform outline of the united posterior slopes.

Loc.—Harper's Hill, near Allandale, West Maitland District (*W. S. Dun*).

Hor.—Permo-Carboniferous tufaceous sandstone of Lower Marine Series.

Mæonia carinata, *Morris*, var. minor, var. nov.

(Plate xxix., figs. 5-8.)

Obs.—*Mæonia carinata* (s.s.) appears to be practically restricted to the Upper Marine Series, for instance, as at Gerringong and Jamberoo in the Illawarra District, and Bundanoon in the Berrima Land District. The peculiar and exaggerated form just described is, as previously stated, from the Lower Marine Series at Harper's Hill, near Allandale Railway Station, West Maitland District.

The variety, or race represented in Pl. xxix., figs. 5-8, is never of large size, with an unmistakable tendency to "stumpiness," with prominent diagonal ridges, approaching those of *M. morrisii*, but the flanks to all intents and purposes in one plane, as in *M. carinata*, and not traversed by wide, pronounced cinctures, similar to those in the former.

It would be interesting to institute a comparison between this variety and the original of a *Mæonia* from the Huon Road, Tasmania, referred by Mr. R. M. Johnston to *M. carinata*,¹¹ with a slightly sigmoidal and outstanding diagonal keel; they are very much alike.

Locs.—Bundanoon Gully, about one and a half miles from Bundanoon Railway Station, Berrima Land District, New South Wales (*W. W. Thorpe*).

Hor.—Upper Marine Series. In the Lower Marine Series at Farley are casts of lesser size than Pl. xxix., figs. 5-8, but possessing characters of a very similar appearance.

Mæonia morrisii, var. (?)

(Plate xxx., figs. 1 and 2.)

Obs.—In this instance we are either dealing with a distinct species or a variety of *M. morrisii* (Pl. xxviii., figs. 7 and 8), notwithstanding the

¹¹ Johnston—Systematic Acc. Geol. Tas., 1888, pl. xi., fig. 15a.

length in relation to the width is so much more disproportionate than in *M. morrisii* proper. Some little distortion has taken place, but even allowing for this the cinctures, strong keel-like diagonals, and nearly flat posterior slopes, are self evident. The concentric lines of decoration are remarkably fine and even, and quite unlike those of the *M. carinatu* group, at Farley are again internal casts, which also allowing for some distortion are very similar to this Lochinvar specimen.

For the present I prefer to regard this shell simply as a variety of *M. morrisii*, but the long, almost "snout-like" posterior end, lends so marked an appearance to this bivalve that in all probability separation will be necessary in the future.

Loc.—Lochinvar, Hunter River, County Northumberland; ? Farley Railway Cutting.

Hor.—Lower Marine Series.

IV.—*Platyschisma oculus*, G. B. Sowerby, *P. rotundatum*, Morris, and *P. depressum*, Dana.

When describing *Platyschisma oculus*, Morris remarked¹² that his *P. rotundatum*, might, after all, be but a variety of the first-named. After examining a number of specimens of both, I believe them to be distinct species.

Platyschisma oculus.¹³—The last, or body-whorl is of even and low convexity above, and flatter, or less convex even below, the two surfaces meeting at an obtuse peripheral angle, keel, or edge, over which the lines of growth pass.

Platyschisma rotundatum.¹⁴—In this form the body-whorl is distinctly rounded, or convex, above and below, there is no peripheral angle, or keel, and "the inner part of the outer lip appears to have been periodically thickened leaving sulcations in the cast." I have never seen this thickening in any example possessing the definite characters of *P. oculus*.

Platyschisma depressum.¹⁵—At first sight Dana's figure of this species might be supposed to represent a univalve crushed from above; such was my opinion previous to receiving a type replica, but the description, "very much depressed, almost disk-form," with flattened whorls, "the outer of which has the back subtruncate" is strictly accurate.

An example of a very depressed, although imperfect shell from Lochinvar agrees with this description, and is provided with a peripheral band, truncating the entire edge or keel, and evidently corresponding to Dana's expression, "back subtruncate"; in fact, I believe there are traces of this band on the replica. The sculpture of the Lochinvar fossil, where the test is preserved consists of the usual lines of growth, coinciding with the lip margin on the upper surface of the whorl, *i.e.*, curving forwards, but on passing over the truncated band-like periphery they are regularly

¹² Morris—Strzelecki's Phys. Descrip. N.S.Wales, etc., 1845, p. 286.

¹³ Morris—*Loc. cit.*, pl. xviii., fig. 1.

¹⁴ Morris—*Loc. cit.*, pl. xviii., fig. 2.

¹⁵ Dana—Wilkes U.S. Explor. Expedn., x. (Geology), 1849, pl. x., figs. 2a and b.

deflected backwards as in an ordinary pleurotomarid band; the test is not preserved on the lower or flattened surface.

The presence of this peripheral band at once removes the species from the genus *Platyschisma*, and indicates *Keeneia*, mihi, as a suitable resting place, thus introducing a depressed form into an otherwise trochiform genus. Now, in *P. oculus*, although the growth sculpture passes over the obtuse peripheral keel, there is no truncate periphery bearing a band.

Platyschisma rotundatum, var. *farleyensis*, var. nov. (Pl. xxviii., fig. 9).—Associated in numbers with the limonitic *Martiniopsis*, *Pleurophorus gregarius*, and *Stutchburia farleyensis* casts at Farley, are similar kernels of small *Platyschisma rotundatum*. All I have seen are of a common size, less than the normal dimensions of examples of the species obtained elsewhere. On these internal casts, the sulci resulting from the protrusion of the inner shelly ribs, described by Morris, are always in evidence and well displayed. The casts seldom exceed one and three quarter inches in greatest basal diameter, and three quarters of an inch in height, they appeal to me as a stunted growth of the ordinary *P. rotundatum*.

V.—Various Species described by Dana.

Amongst the Pelecypoda collected in New South Wales by Prof. J. D. Dana were two species described as *Cardinia* (?) *recta*¹⁶ and *C. (?) cuneata*,¹⁷ and as *Solecurtus* two species, *S. (?) ellipticus*¹⁸ and *S. (Pseudomobia ?) planulatus*.¹⁹ To *Cypricardia* were also referred *C. acutifrons*,²⁰ *C. imbricata*,²¹ *C. arcodes*,²² *C. prærupla*,²³ *C. simplex*,²⁴ *C. (Avicula ?) veneris*,²⁵ and *C. siliqua*.²⁶ Of the above I have already dealt with *Cardinia simplex*, referring it to a new genus, *Stutchburia*.

The following remarks on ten of the above are based on replicas of Dana's types. These were most obligingly supplied by the United States National Museum, Washington, where Dana's gatherings are located.

1. [*Cardinia*] *recta*, Dana.—When describing *Stutchburia farleyensis* I alluded to *Cardinia* (?) *recta*, and *C. (?) cuneata* as possibly referable to *Stutchburia*, "in which case the generic characters of the latter, will of necessity require to be slightly modified" to allow of the inclusion of more or less similar bivalves, but with nasute posterior ends. This suggestion will stand good with regard to *C. (?) recta*, but not I now believe in the case of *C. (?) cuneata*. By incorporating the first of these bivalves in *Stutchburia* it will not be necessary to enlarge the generic characters in question. I have before me a cast of one of Dana's types of his *C. (?) recta*²⁷ (Pl.

16	Dana—Wilkes U.S. Explor. Expedn., x. (Geology), 1849, pl. iv., figs. 5, 5a and b.
17	" " " " pl. iv., figs. 6, 6a-d.
18	" " " " pl. ii., fig. 9.
19	" " " " pl. ii., fig. 10.
20	" " " " pl. viii., figs. 4a and b.
21	" " " " pl. viii., fig. 5.
22	" " " " pl. viii., fig. 8b.
23	" " " " pl. viii., fig. 10.
24	• " " " pl. ix., fig. 2.
25	" " " " pl. ix., figs. 3a and b.
26	" " " " pl. ix., figs. 1a and b.
27	" " " " pl. iv., fig. 5.

xxx., fig. 7) and accept this in preference to the figure cited, which, I regret to say, is most misleading in that the cardinal, or dorsal, line is not arcuate, or inclined, but straight as in *Stutchburia* proper. The anterior end does not terminate just before the adductor scar, but extends some way still forwards; the flanks are not cinctured as the figure shading would indicate, and the radii are distinctly visible extending over two thirds of the surface; so far as I can see the shell was edentulous as in *Stutchburia*. As regards Dana's Fig. 5a I make no comment.

Loc.—“Illawarra.”

2. [*Cardinia* ?] *cuneata*, Dana.—In this instance the illustrations and type casts are strictly in accord with one-another. Several casts are in the collection (Pl. xxx., figs. 4-6) similar in all features to Dana's description and figures, compressed valves, arcuate dorsal margins and nasute posterior ends, but with radiate sculpture, which, according to Dana, was not present on his specimens (Pl. xxx., fig. 3); this is borne out by the replicas before me. I am unable to explain this discrepancy, for there can hardly be two forms, otherwise exactly alike, and differing only in the one feature. Although the hinge was edentulous [*C. ?*] *cuneata* can hardly be placed in *Stutchburia*, or at any rate only provisionally.

Loc.—Wollongong, Illawarra District (*W. S. Dun*).

Hor.—Upper Marine Series.

3. *Solecurtus* (?) *ellipticus*, Dana.—Provided the replica is a faithful reproduction of the original, the latter can only be regarded as a meaningless impression without character or structure; the name may be struck off the list of our Permo-Carboniferous fossils.

4. *Solecurtus planulatus*, Dana.—Drawn from a featureless impression as represented by the replica; another name to be deleted.

5. [*Cypricardia*] *simplex*, Dana.—Already referred to *Stutchburia*.

6. [*Cypricardia*] *prærupta*, Dana.—In the absence of any negative characters, I tentatively refer this to *Stutchburia*. Dana described the anterior adductor scars as circular, but they appear to be much more of the “leg of mutton” shape, so characteristic of the foregoing genus. The published figure is much too lithodomoid, and the ventral margin is not inflected as shown in the illustration.

Loc.—“Illawarra.”

7. [*Cypricardia*] *acutifrons*, Dana.—The figures are again most misleading in that the anterior ends in the replica do not terminate in acute prolongations, the antero-ventral margins are not inflected to the degree represented, and the actual margins of the united valves and therefore the true outlines are not preserved. The species is again referred to on a succeeding page.

Loc.—“Illawarra.”

8. [*Cypricardia*] *imbricata*, Dana.—As a representation of the original,²⁸ portions of the two valves united, this figure is also erroneous. It is less perfect than represented, the concentric sculpture rendered far too

²⁸ Dana—*Loc. cit.*, pl. viii., fig. 5.

plain and the posterior wing more or less restored, but probably correctly so. I suggest its identity with de Koninck's figure of *Pterinea macroptera*, but not with Morris's bivalve of the same name. Again, it is not far removed from the smaller of the two figures of *Modiola crassissima*, which, it is almost needless to say is not a *Modiola*.

Loc.—Harper's Hill.

9. [*Cypricardia*] *veneris*, Dana.—Another of Dana's illustrations that puzzled me for many years; I have not a replica of this specimen, but some light is, I think, thrown on [*C.*] *veneris* by a shell collected at Wollongong by Mr. W. S. Dun (Pl. xxxi., fig. 8). This is a very transversely-elongate, more or less siliquiform bivalve, attenuated at the anterior ends, and thence slightly expanding to the posterior. The cardinal margins are more or less eroded but they were long, straight and apparently edentulous. The anterior ends are peculiarly lobe-like, and obtusely pointed, whilst the posterior comprise quite nine-tenths of the valves. The sculpture was both concentric and radiate, the oblique radii from the umbos extending over the median and posterior surfaces. Although Dana's figure was evidently drawn from a poor and imperfect specimen, still, the same insinuated ventral margins as existing here, the tendency to a siliquiform outline, and the large number of radii, only equalled by those of *Stutchburia costata*, will, I believe, uphold the accuracy of this reference. The generic identity of this fossil must remain open for the present.

Loc.—Glendon, Hunter River.

There are also in the collection other *Stutchburia*-like shells of doubtful identity, three of which may be mentioned to attract the attention of collectors.

Stutchburia, 1. In form like *S. costata*, Morris, but stouter, and each valve traversed by three well marked radii only, from the umbos to the middle of the ventral margins.

Loc.—Wollongong, Illawarra District (*W. S. Dun*).

Hor.—Upper Marine Series.

Stutchburia (?) 2. A small and oblique form with about six radii occupying a similar position to those on No. 1. The concentric sculpture is very regular and fine, and on crossing the radii, a coarse decussation is apparent.

Loc. and *Hor.*—As in No. 1.

Stutchburia (?) 3.—Of the *S. costata* type in general, but pod-shaped, and with the whole of the posterior two-thirds of the valve surfaces radiate, the most anterior radii striking the ventral margins, at about their middle points; the first four radii are distinctly spaced apart.

Loc. and *Hor.*—As in No. 1.

VI.—*Cypricardia acutifrons*, Dana, *C. arcodes*, Dana, *C. imbricata*, Dana, and *Pterinea macroptera*, Morris, Dana, and de Koninck, in relation to the genus *Merismopteria* and to one-another.

Pterinea macroptera, Morris, was selected by me as the type of the genus *Merismopteria* in 1892,²⁹ and since then I have not seen any reason to doubt the propriety of the step taken.

Morris recorded his species from Spring Hill, Tasmania, and although in common with others, I have been in the habit of listing pterinform fossils of Permo-Carboniferous age found in New South Wales, under the name in question, I have now, after a close study of the matter, come to the conclusion *Merismopteria macroptera*, is not a New South Wales fossil, or at any rate if so, excessively rare, but confined to Tasmania. Even the illustration of this shell by the late Mr. R. M. Johnston in his work on the Geology of Tasmania is but a copy of Morris' Fig. 2.

Dana was the first to introduce *Pterinea macroptera* into the New South Wales list in 1849. The replica impression represents a somewhat imperfect shell, but notwithstanding, it is the nearest approach to Morris' Fig. 2, I remember to have seen, and may possibly be the species.

Loc.—"Illawarra."

[*Cypricardia*] *imbricata*, Dana, a true *Merismopteria*, is intermediate between *M. macroptera*, Morris, and [*Cypricardia*] *acutifrons*, Dana. It is less transversely oblique than the first-named, and although the anterior end projects to some extent, it lacks the peculiar lobate appearance of *M. macroptera*, proper.

Loc.—Harper's Hill.

Pterinea macroptera, de Koninck, from the "neighbourhood of Maitland," is again not that of Morris, but is the species first referred to, *M. imbricata*, Dana, when allowance is made for the relative positions of the anterior adductor scar and clavicle impression.

Do both Morris' figures of his *Pterinea macroptera*, represent one and the same species?; it will not surprise me to learn from an examination of the type specimens that they do not. His Fig. 3, if a correct representation of the original appears to be so disproportionately long in comparison with Fig. 2, that doubt of its specific identity is aroused. In connection with this, arises the question, what is *Cypricardia acutifrons*, Dana? Long a puzzle to me, the type replica reveals its *Merismopteria* affinity, but distinct from both *M. macroptera*³⁰ and *M. imbricata*, and is a moderately common New South Wales fossil. It is remarkable for the extent of its transverse obliquity, extended cardinal margins, and gently insinuated ventral outline. Dana obtained his specimen at "Illawarra."

[*Cypricardia*] *arcodes*, Dana, is another *Merismopteria*, and distinct from any of the foregoing. It is a pronounced *Merismopteria*, and although a smaller, it is a much more robust species, its chief features being a more "nuggety" outline and proportions, with evenly rounded and gibbous posterior diagonal slopes; the clavicle cavity is deep and wide.

Loc.—Harper's Hill.

²⁹ Etheridge—Geol. Pal. Q'land, 1892, p. 271.

³⁰ de Koninck suggested the identity of *Pterinea macroptera*, Morris, and *Cypricardia acutifrons*, Dana (*Foss. Pal. Nouv. Galles du Sud*, pt. 3, 1877, p. 166).

EXPLANATION OF PLATE XXVIII.

Martiniopsis strzelecki, de Koninck.

- Fig. 1. Brachial valve and portion of pedicle valve exhibiting the slits left by the decay of the dental plates in the pedicle valve, and those of the septal plates in the brachial valve. A cast from the Upper Marine Series of Nowra Hill, Shoalhaven, in the Berry School of Arts.

Martiniopsis subradiata.

- „ 2. Portion of weathered test of a specimen of *Martiniopsis subradiata*, from Farley, exhibiting lines radiating in two directions enclosing acutely rhomboidal spaces, highly magnified.
- „ 3. A similar specimen of this species from Farley exhibiting long tear-like tubercles which apparently represent the junctions of the converging lines seen in Fig. 2, highly magnified.

Dielasma jervisensis, Eth. fil.

- „ 4. Cast of a broad oval brachial valve of low convexity, a very uncommon form of the genus. Cabbage Tree, Jervis Bay.

Martiniopsis subradiata, var. branxtonensis, Eth. fil.

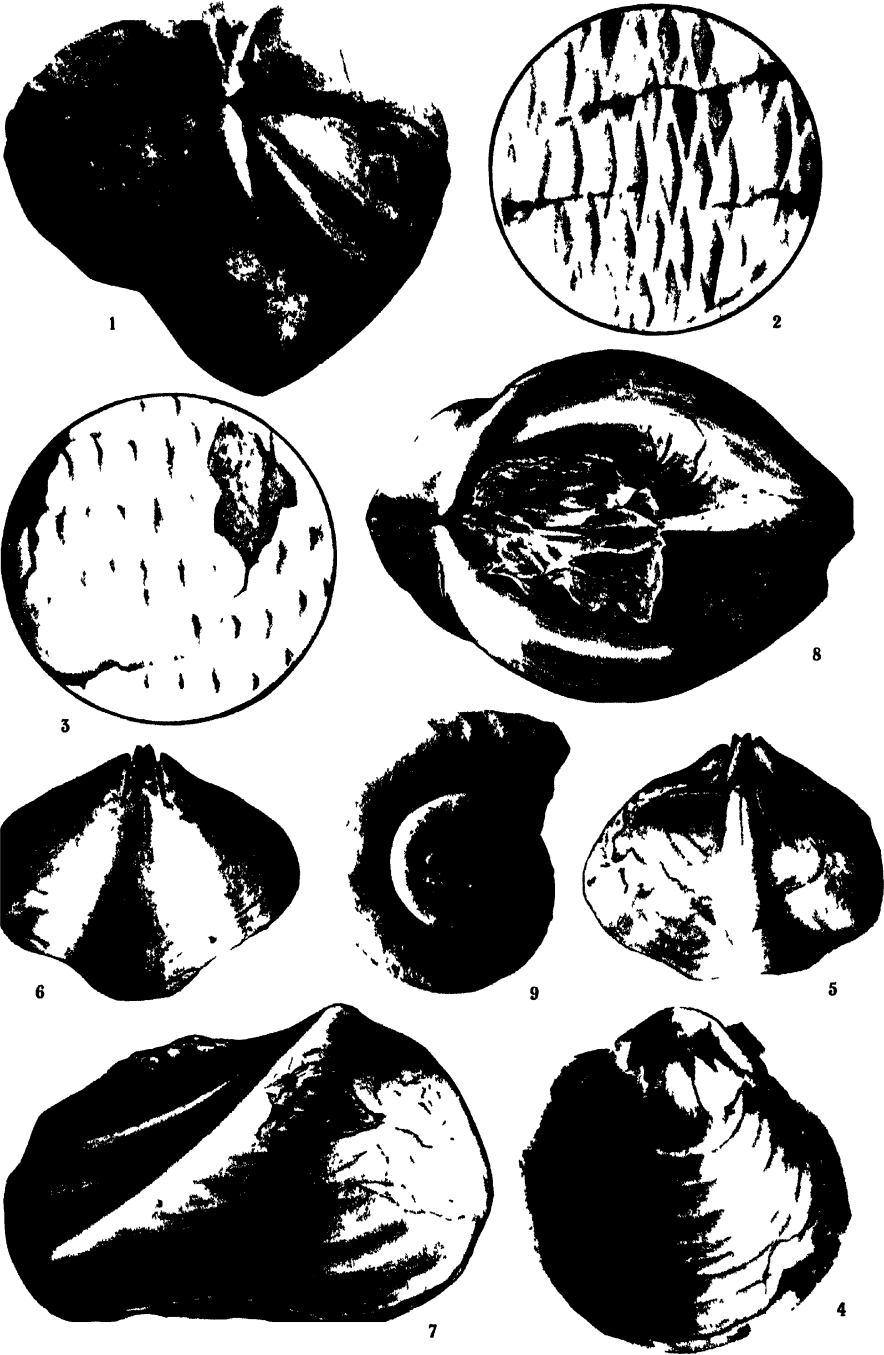
- „ 5. Brachial valve and umbo of the pedicle valve of a dwarf form, representing the average size attained by the variety.
- „ 6. Pedicle valve of the same.

Mæonia morrisii, Eth. fil.

- „ 7. Lateral view of right valve, with patches of test remaining, short, gibbous, and prominent diagonal ridge. Harper's Hill.
- „ 8. Cardinal or dorsal view of the united valves of the same specimen; the strongly curved prominent ridges are well displayed.

Platyschisma rotundatum, var. farleyensis, Eth. fil.

- „ 9. Internal limonitic cast, exhibiting the average normal size of the variety with the sulci resulting from the inward protrusion of the shelly ribs.



EXPLANATION OF PLATE XXIX.

Martiniopsis subradiata, var. *branxtonensis*, *Eth. fil.*

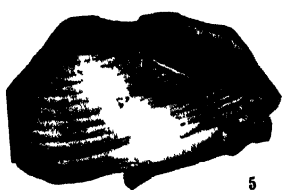
- Fig. 1. View of brachial, and umbonal region of pedicle valve; the former is bi-plicate. Branxton.
- „ 2. A similar specimen to that represented in Fig. 1, multiplicate. Farley.

Dielasma inversa, de *Koninck*.

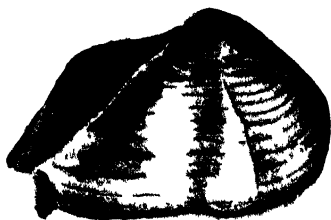
- „ 3. Brachial, and umbonal portion of pedicle valve, with little or no trace of lateral folds. Wollongong.
- „ 4. A similar specimen to that represented in Fig. 3, with lateral folds more marked. Wollongong.

Mæonia carinata, var. *minor*, *Eth. fil.*

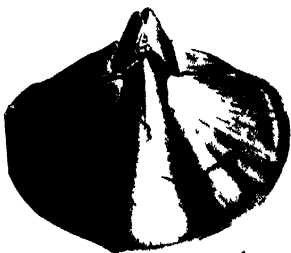
- „ 5. Left valve. Bundanoon Gully. .
- „ 6. Right „ „ „
- „ 7. Left „ „ „
- „ 8. Dorsal or cardinal view. Bundanoon Gully.



5



6



1



2



3



8



7



4

EXPLANATION OF PLATE XXX.

Mæonia morrisii, *Eth. fil.*, var. ?

Fig. 1. Right valve. Notice the proportional elongation and wide curvature of the diagonal ridge. It is probably a distinct species. Lochinvar.

„ 2. The same specimen, dorsal view.

[*Cardinia*] *cuneata*, *Dana*.

„ 3. Drawn from a reproduction of one of Dana's type specimens (Wilkes U.S. Explor. Expedn., x., Geology, pl. iv., fig. 6) by which, it will be seen, there are no radii.

„ 4. Natural cast in the Museum Collection of the same species as that represented by Fig. 3, but with radii. Wollongong.

„ 5. Another example similar to Fig. 4. Wollongong.

„ 6. A third radiate example. Wollongong.

[*Cardinia*] *recta*, *Dana*.

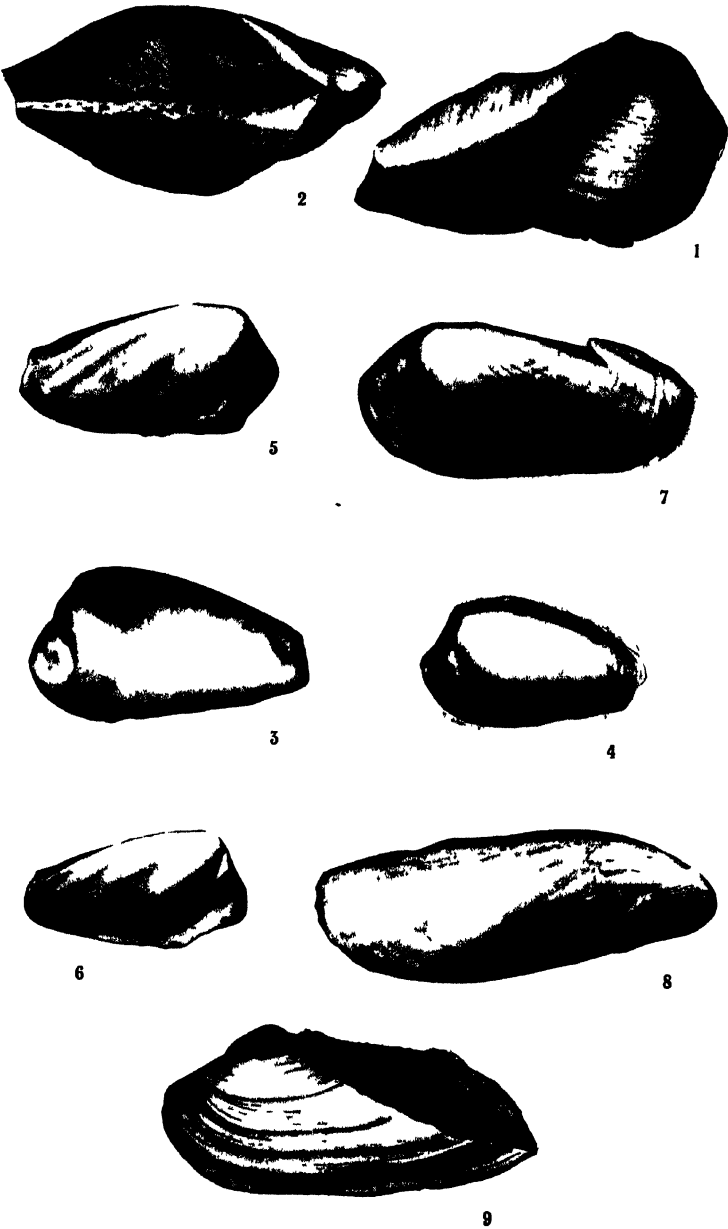
„ 7. Drawn from a reproduction of one of Dana's type specimens (Wilkes U.S. Explor. Expedn., x., Geology, pl. iv., fig. 5). "Illawarra."

[*Cypricardia*] *veneris*, *Dana*.

„ 8. A very transversely elongated, siliquiform bivalve, probably a *Stutchburia*, but distinct from both *S. costuta* and *S. compressa*. Wollongong. $\frac{1}{2}$ nat.

Mæonia carinata, var. *minor*, *Eth. fil.* ?

„ 9. Possibly a sub-variety, narrower and more elongate. A left valve. Bundanoon Gully.



SOME AUSTRALIAN FISHES OF THE FAMILY GOBIIDÆ.

BY

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and

J. DOUGLAS OGILBY, Zoologist, Queensland Museum.

(Plates xxxi-xxxvii.)

It was the original intention of the authors to revise all the Australian species of the Family Gobiidæ, but circumstances have prevented us from carrying out our design. We therefore submit descriptions and figures of such species as we have been able to deal with, and give references to the others. We have been unable to allocate some of the species dealt with to any genera known to us, but as we lack several important papers on the classification of the Gobiidæ, we have preferred to leave them under the broader headings *Gobius* and *Eleotris* rather than create unnecessary additions to the already long list of Gobioid genera.

We have had the advantage of examining the very large collections contained in the Australian Museum, the Queensland Museum, the Macleay Museum, and the South Australian Museum. These include numerous types and cotypes, and many authentically labelled specimens, while the Australian Museum is fortunate in possessing a representative series of Indian fishes from the collection of the late Dr. Francis Day. All these have enabled us to clear up many points in the synonymy of the species dealt with.

We are greatly indebted to the Trustees of the Macleay Museum for the loan of all the Gobies and Eleotrids under their charge. We also have to thank Mr. Edgar R. Waite, Director of the South Australian Museum, for the loan of those in his collection.

Key to the Subfamilies of the Gobiidæ.

- a. Pectoral base very muscular and mobile; eyes erectile... ..*Periophthalminae*.
- aa. Pectoral base not unusually muscular or mobile; eyes not erectile.
 - b. Ventral fins more or less united, usually with an anterior membrane connecting the spines¹.*Gobiinae*.
 - bb. Ventral fins separate, with no anterior membrane between the spines.....*Eleotrinae*.

Family GOBIIDÆ.

Subfamily PERIOPHTHALMINÆ.

Periophthalminae, Regan, Ann. Mag. Nat. Hist. (8), viiii., 1911, p. 733.

Eyes close together, prominent, erectile; base of pectoral fin very muscular. Pectoral radials elongate, inserted on a broad, laminar ridge of the cleithrum; hypocoracoid and cleithrum enclosing a large foramen, Vertebrae 25-26 (10-11+14-16).

¹ This membrane is present in some species of *Zonogobius* (*Z. nuchifasciatus*), but is wanting in others (*Z. semidoliatus*).

Key to Australian genera.

- a. Soft dorsal with about 12 rays. Teeth vertical in both jaws, conical, and sub-equal.
 - b. Teeth uniserial in both jaws; scales small.....*Periophthalmus*.
 - bb. Teeth biserial in the premaxillaries; scales larger.....*Periophthalmodon*.
- aa. Soft dorsal with about 25 rays. Mandibular teeth more or less horizontal; those of the premaxillaries unequal, some subulate.
 - c. Body scales small but distinct; mandibular teeth arranged in a row which does not curve inwards posteriorly.....*Boleophthalmus*.
 - cc. Body scales rudimentary; mandibular teeth in a row which curves inward posteriorly.....*Scartelaos*.

PERIOPHTHALMUS, Bloch & Schneider.

Periophthalmus, Bloch & Schneider, Syst. Ichth., 1801, p. 63 (*P. papilio*, Bloch & Schneider).

Euchoristopus, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 271 (*Gobius koelreuteri*, Pallas).

Form moderately elongate, subcylindrical anteriorly, compressed posteriorly. Body covered with small, cycloid scales, which extend onto the head. Mouth rather small, horizontal, the upper jaw overhanging the lower; lips with fleshy lobes and swellings. Eyes erectile, contiguous, on the upper profile of the head; lower eyelid well developed. Anterior nostrils opening in lobules above the upper lip; posterior nostrils simple openings before the eye. Teeth in a single row in each jaw, vertical, conical, and pointed. Tongue thick, adnate to the floor of the mouth. Gill-openings lateral, separated by a broad isthmus. Two dorsal fins, the first with spines varying in number up to fifteen; second dorsal short, with about twelve rays. Anal opposite and similar to the second dorsal. Pectoral with a scaly muscular base. Ventrals more or less united or wholly separate, with one spine and five rays.

Small fishes of the estuaries and mud-flats of the tropical Indian and Pacific Oceans, one species ranging northward to Japan.

PERIOPHTHALMUS KOELREUTERI (Pallas), Günther.

var. ARGENTILINEATUS, Cuvier & Valenciennes.

(Plate xxxi., fig. 1.)

Periophthalmus koelreuteri (Pallas), Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 97.

Periophthalmus argentilineatus, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 191.

D. xii-xvi/12-13; A. 12; P. 13; V. i/5; C. 15. Depth 5·7 in the length to the hypural joint; head 4·2 in the same. Eye 4 in the head. First dorsal spine 1·1, median dorsal rays 2·1, median anal rays 2·7 in the head.

Head largely naked, the upper posterior portion of the cheeks and opercles covered with imperfect scales. Eye elevated, contiguous with its fellow on the upper profile of the head; lower eyelid distinct. Snout broad and rounded, with two fleshy protuberances over the mouth, at the tips of which are the anterior nostrils; posterior nostrils situated a little in advance of the eye. Upper lip thick and fleshy, expanded into a broad lobe posteriorly, lower lip with a thick swelling posteriorly; angle of the mouth falling below the middle of the eye. Teeth in each jaw in a single row, short and conical, a few slightly enlarged; palate toothless. Tongue adnate to the floor of the mouth. Gill-opening lateral, not so wide as the isthmus.

Body covered with small cycloid scales which extend forward to behind the eyes, and cover the base of the pectoral and portion of the breast. There are about seventy rows between the base of the pectoral and the hypural joint, and about twenty-four between the anterior dorsal and anal rays. Genital papilla well developed.

First dorsal commencing behind the base of the pectorals; the first spine is usually highest, and the succeeding ones decrease rapidly in length so that the fin is emarginate anteriorly, but may be obliquely truncate; it is separated from the second dorsal by a short interspace. Second dorsal slightly rounded, the middle rays a little longer than the others. Anal opposite the second dorsal but a little more rounded and lower than that fin. Pectoral a little pointed, the median rays longest and reaching the vertical of the vent. Ventrals inserted well before the pectorals, with short, thick rays, and united by a membrane which is so deeply incised that they are almost separate. Caudal broadly rounded, with its lower rays thickened, pennulate and short.

Colour-marking.—Greyish brown, with dark bars descending obliquely forward onto the sides; the lower portions of the sides with lighter spots and bars, the head dotted with white. Basal half of the dorsal fins grey, closely speckled with white; a broad, black, white-edged, submarginal band is present on each fin, the broader outer edge forming their white margins. Caudal with irregular bars of dark spots on the rays. Pectoral spotted like the caudal. Ventrals and anal white, with dusky markings.

The above description is based on seven examples, 50-90 mm. long; the proportions are those of the largest specimen, which is figured. They were taken together at King Sound, North Western Australia, and are similar in all structural details and colour-marking, varying only in the relative lengths of their anterior dorsal spines.

Variation.—A series of thirty-two specimens 28-94 mm. long, collected together within a space of a few yards at Cooktown, exhibits remarkable variation in the form and construction of the first dorsal fin. The spines vary from 8-15, the number being usually, though not always greater in the larger examples. The posterior spines are sometimes present in young examples, though very minute and difficult to detect; in others they are wholly wanting, and the fin ends abruptly at the eighth or ninth spine. The distance between the two dorsal fins is greater or smaller according to the number of spines developed posteriorly. The margin of the fin is rounded in younger specimens, but in adults the anterior spines are

somewhat produced, so that the margin becomes excavate as in the specimen figured. The following table illustrates the variation of seven examples selected from the above series.

Length.	Number of spines.	Shape of fin.
28 mm.	9	rounded.
29 "	15	"
34 "	8	"
37 "	10	"
57 "	13	emarginate.
71 "	15	"
94 "	13	"

Habits.—The habits of *P. koalreuteri* have been observed by one of us (McCulloch) at several localities in Queensland. They move freely about on the mud, when the tide is out, in search of small crustaceans and insects, upon which they feed. When alarmed they skip rapidly away by means of their powerful pectoral, ventral and caudal fins, and retreat into a crab-burrow or some other crevice. At Cooktown, they were abundant around a narrow stream, a few yards in width, which enters Finche Bay; although many were driven towards the water, it was observed that none entered it, but skipped over its surface in a series of short quick leaps to the other side.

At Port Curtis, it was noted that the rapid jumping movements usually seen when they are on land are only adopted as a means of escape. When undisturbed, they move in stages of two or three inches by raising the fore-part of the body on the pectorals, levering themselves forward; at the same time the ventrals are moved forward so that they act alternately with the pectorals, each fin of either pair moving in unison with its fellow. After each interval of walking, the fish looks around for prey by means of its elevated eyes, which are occasionally turned down into their sockets, apparently to moisten them. The agility of these little fishes on the mud is so great that it is difficult to secure specimens without injuring them, and series could only be secured for study with a large cloth, which was spread over the mud, and suddenly lifted by strings when the fishes hopped over it. They are astonishingly fearless, and if driven from their feeding grounds, soon return, approaching to within a few inches of one if no movement alarms them.

These fishes are very vicious towards one another, and the smaller examples were noticed to retreat, before the approach of their larger fellows. From the fact that small crabs scurry into their burrows at the approach of a *Periophthalmus*, it would seem that they largely supply it with food, and one fish was observed to spring a distance of about six inches at a crab, which it secured and munched with evident relish.

At Epi, in the New Hebrides, numbers of *Periophthalmus* were observed basking together in the hot sun on top of smooth basaltic rocks, about five feet above the level of the sea. It was also noted that specimens placed in glass jars could climb the smooth surface of the glass with ease, although their ventrals are not united into sucking discs as in the gobies.

Identity.—The species here described and figured is the commonest Australian species of *Periophthalmus*, and has been generally identified as *P. koelreuteri*, Pallas. It appears probable, however, that several species have been united under that name, the limits and variations of which do not appear to have been satisfactorily determined, so we are not sure that our specimens are correctly identified with Pallas's species. They are apparently referable to the variety *argentineatus*, Cuvier and Valenciennes.

Locs.—We have examined specimens having the same characters as those described above from the following localities. Cape Bedford, Queensland; coll. C. Hedley & E. A. Briggs, August, 1916. Cooktown, Queensland; coll. McCulloch, June, 1918. Sunday Island, King Sound, North-western Australia; coll. Dr. H. Basedow. India; Dr. Francis Day's collection. Samoa; coll. Prof. D. S. Jordan. Bougainville Island, Solomon Group; coll. Count Morner.

PERIOPHTHALMODON, Bleeker.

Periophthalmodon, Bleeker, Arch. Neerl. Sc. Nat., ix., 1874, p. 326 (*Gobius schlosseri*, Pallas).

This genus only differs from *Periophthalmus* in having larger scales on the head and body, and in its dentition. There are about fifty rows of scales between the pectoral base and the hypural joint, and the mandibular teeth are in two rows, the outer ones being canines and the inner smaller.

Distribution.—Bay of Bengal to Northern Australia and the Western Pacific Ocean.

PERIOPHTHALMODON BARBARUS, Linné.

(Plate xxxi., fig. 2.)

Gobius barbarus, Linné, Syst. Nat. (12th ed.), 1766, p. 450. *Id.*, Bonnat-terre, Encycl. Meth., Ichth., 1788, p. 63, pl. xxxv., fig. 137.

Gobius schlosseri, Pallas, Spicil. Zool., viii., 1770, p. 1, pl. i., figs. 1-4.

Periophthalmus schlosseri, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 192. *Id.*, Gunther, Brit. Mus. Cat. Fish., iii., 1861, p. 100.

Id., Day, Fish. India, 1876, p. 304, pl. lxvi., fig. 4 (*vide* synonymy).

Periophthalmus schlosseri, Gunther, Challenger Rept., Zool., i., 1880, p. 33.

Id., Garman, Bull. Mus. Comp. Zool., xxxix., 1903, p. 235.

Periophthalmus australis, Castelnau, Res. Fish. Aust. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 22. *Id.*, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 334, pl. xi., fig. 3. *Id.*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 48. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 614, and viii., 1883, p. 206. *Id.*, Kent, Proc. Roy. Soc. Qld., vi., 1889, p. 240.

D. iv/13; A. 12; P. 16; V. i/5; C. 15. Depth 4.3 in the length to the hypural joint; head 3.1 in the same. Eye 6.2 in the head. First dorsal spine 2.1, eleventh dorsal ray 2, tenth anal ray 3.1 in the head.

Head covered with large scales, the throat naked. Eye elevated, touching its fellow on the upper profile of the head; lower eyelid distinct. Snout broad and rounded, with paired fleshy protuberances; two fleshy lobes over the upper lip, into which the anterior nostrils open. Upper lip thick, the lower with a fleshy lobe posteriorly; angle of the mouth falling below the hinder margin of the eye. Premaxillaries with several strong canines near the symphysis, followed by smaller teeth on the sides; an inner row of small teeth anteriorly. Mandibular teeth in a single row, and smaller than those of the upper jaw. Tongue adnate to the floor of the mouth. Gill-opening lateral, about as wide as the isthmus.

Body covered with scales of moderate size, which extend forward to the eyes, and onto the breast and base of the pectoral. There are fifty rows between the base of the pectoral and the hypural joint, and about fourteen between the anterior dorsal and anal rays. Genital papilla well developed.

First dorsal commencing well behind the base of the pectorals; the first spine is highest, the others decrease backward, and the space between the last and the anterior ray is equal to about two-thirds the length of the head. Second dorsal increasing in height to about the eleventh ray, which is as high as the first spine. Anal opposite and of similar form to the second dorsal, but lower. Pectoral rounded, with bifurcate rays, the median ones longest, but scarcely reaching the vertical of the vent; the lower half of the median rays is covered with stout scales. Ventrals inserted beneath the end of the operculum, the two fins completely united. Caudal rounded, its lower rays short.

Colour.—General colour dark brown in formaline, white below, each scale of the lower portion of the sides with a bluish centre. Dorsals, pectorals and caudal brownish, with light margins; ventrals and anal white.

Described and figured from a specimen 197 mm. long. Twelve other specimens 163-255 mm. long exhibit but little variation, though some have five instead of four dorsal spines.

Synonymy.—The name *Gobius barbarus*, Linné, should apparently apply to this species, and not to *P. koelreuteri*, to which it has hitherto been referred. Linné quoted no references under his *G. barbarus*, while such characters as he gives do not enable one to identify his species. Pallas later described *P. schlosseri* and *P. koelreuteri*, but his work is unfortunately not available to us. Bonnaterre, however, gave recognisable figures of both "Le Schlosser" and "Le Koelreuter," which were copied from Pallas according to Cuvier and Valenciennes², and he attached the name *G. barbarus* to the former. As there seems to be no reason to suppose he was incorrect, we follow him in identifying Linné's species with *P. schlosseri*.

Periophthalmus australis, Castelnau, described from Northern Queensland, is evidently synonymous with *P. barbarus*.

² Cuvier & Valenciennes—Hist. Nat. Poiss., xii., 1837, pp. 181 and 192—footnotes.

Locs.—Cairns, North Queensland. Cooktown, North Queensland; coll. E. A. C. Olive. Paira Creek, Cape York; coll. Hedley and McCulloch, October, 1907. Melville Island, Northern Australia.

In addition to these localities the species has been recognised from Keppel Bay (Garman); Cardwell (Günther); Burdekin and Mary Rivers (Macleay); Cape York (Macleay); Norman River (Castelnau); Port Darwin (Macleay and Kent). Tenison Woods³ intimates that the species occurs in the Richmond River, New South Wales, but this is doubtless incorrect.

BOLEOPHTHALMUS, Cuvier & Valenciennes.

Boleophthalmus, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 198 (*Gobius boddaerti*, Pallas). *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 101. *Id.*, Day, Fish. India, 1876, p. 304. *Id.*, Jordan & Snyder, Proc. U.S. Nat. Mus., xxiv., 1901, p. 47.

Form moderately elongate, subcylindrical anteriorly, compressed posteriorly. Body covered with small or rather large scales, which become rudimentary anteriorly, and are obsolete on the head. Mouth of moderate size, a little oblique, the upper jaw overlapping the lower. Eyes prominent, placed high in the head, close together; lower eyelid well developed. Teeth uniserial in the premaxillaries, some of the anterior ones large and subulate, the others becoming abruptly smaller; mandibular teeth almost horizontal, flattened and usually notched at their tips; they are largest anteriorly and arranged in a row which does not curve inward posteriorly; a large inner canine on each side of the mandibular symphysis. Tongue thick and rounded, adnate to the floor of the mouth. Gill-opening lateral, separated by a broad isthmus. Dorsal fins separate, the first high, with about five spines. Second dorsal long, with 25-28 rays; anal similar to the second dorsal. Pectorals with a scaly, muscular base. Ventrals completely united.

BOLEOPHTHALMUS CAERULEOMACULATUS, McCulloch & Waite.

Boleophthalmus caeruleomaculatus, McCulloch & Waite, Rec. S. Austr. Mus., i. 1, 1918, p. 79, pl. viii., fig. 1.

Loc.—Adelaide River, Northern Territory.

GENUS SCARTELAOS, Swainson.

Scartelaos, Swainson, Nat. Hist. Classif. Fish., ii., 1839, p. 279 (*Gobius viridis*, Buchanan).

Boleops, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 271 (*Boleophthalmus aucupatorius*, Richardson).

³ Tenison Woods—Fish and Fisheries N.S. Wales, 1882, p. 27.

Body elongate and compressed, wholly or partly covered with minute rudimentary scales which become obsolete on the head. Head large, wider than deep, opercular region swollen. Snout rounded, the upper jaw longest; mouth wide, slightly oblique, the upper lip thick and the lower thin; the jaw laterally fringed. Premaxillary teeth uniserial anteriorly, large and subulate, becoming abruptly smaller posteriorly; mandibular teeth similar but smaller, the posterior ones in a row which curves inward; a large canine on each side of the mandibular symphysis. Tongue adnate, with a rounded tip. Anterior nostril in an elongate tube situated at the outer angle of the snout. Eyes superior, protractile, contiguous. Gill-opening narrow and subvertical, the isthmus wide; five branchiostegals. First dorsal with five flexible spines, one or more of which may be produced into filaments; second dorsal low with a rudimentary spine and 26-29 rays. Anal similar to the second dorsal with i/24-26 rays. Pectoral short and rounded with 13-21 rays and a strong muscular base. Ventrals wholly united, with i/5 rays. Caudal cuneate, with 13-15 rays of which the lower are short and muscular. Intestinal canal long, with many convolutions. Vertebrae 25 (11+14).

Affinities.—*Scartelaos* is very closely allied to *Boleophthalmus*, but differs in having the mandibular teeth subulate and arranged in a row which curves inward posteriorly; the body is more elongate, and covered with only minute rudimentary scales.

In addition to the genotype, this genus includes *Boleophthalmus tenuis*, Day⁴, and *B. glaucus*, Day⁵.

Habitat.—Small fishes from the littoral zone of the Indian, Malayasian and North Australian Seas, frequenting the mud-flats of tidal rivers.

SCARTELAOS VIRIDIS, Buchanan.

(Plate xxxii., fig. 1.)

Gobius viridis, Buchanan, Fish. Ganges, 1822, pp. 42, 45, 366, pl. xxxii., fig. 12.

Boleophthalmus histiophorus, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 210.

Boleophthalmus viridis, Cuvier & Valenciennes, *Ibid.*, p. 213. *Id.*, Cantor, Cat. Malay. Fish., 1850, p. 195. *Id.*, Bleeker, Verh. Bat. Gen., xxv., 1853, Beng. en Hind., p. 50. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 104. *Id.*, Day, Fish. India, 1876, p. 307, pl. lxvi., fig. 5. *Id.*, Waite, Rec. Austr. Mus., iv., 1902, p. 194.

Boleophthalmus sinicus, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 215.

Boleophthalmus chinensis, Cuvier & Valenciennes, *Ibid.*

Boleophthalmus ancapatorius, Richardson, Voy. "Sulphur," 1842, p. 148, pl. xlii., figs. 1-2, and Rept. Ichth. China, 1846, p. 208.

⁴ Day—Fish. India, 1876, p. 305, pl. lxv., fig. 1.

⁵ Day—*Ibid.*, p. 306, pl. lxv., fig. 3.

- Apocryptes macrophthalmus*, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 87.
- Gobiosoma guttatum*, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 357, pl. ix., fig. 6.
- ? *Gobiosoma punctularum*, De Vis, Proc. Linn. Soc. N.S.Wales, viii., 1884, p. 449.
- Scartelaos viridis*, Jordan & Seale, Proc. U.S. Nat. Mus., xxviii., 1905, p. 794, fig. 5.
- Pseudapocryptes guttatum*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 408.
- ? *Pseudapocryptes punctularum*, Jordan & Seale, *Ibid.*

D. v, i/26-27; A. i/24-26; P. 21; V. i/5; C. 17. Depth of the body 6.5-9.1 in its length⁶; and equal to about half the length of the head; head 3.6-4.4 in the length of the body, one-fifth to one-third wider than deep, and two-fifths to two-thirds longer than wide. Eye 3.75-5.5 in the head and shorter than the snout, which is 3.1-3.8 in the head. Breadth of the body behind the pectorals 1.2-1.5 in the depth.

Upper surface and sides of the head with non-imbricate rudimentary scales, appearing as pit-like depressions. Profile of the snout strongly rounded. Anterior border of the upper lip with eleven unequal papillæ, the lateral border crenulate. Mandible with a well developed mental barbule. Cleft of the mouth extending to below the posterior border of the eye, its length, 2.3-2.8 in that of the head. Upper jaw with seven or eight pairs of enlarged subulate teeth, which are followed by six to eight, similar, but much smaller, teeth; mandible with fifteen pairs of enlarged teeth, and four smaller ones behind them; a pair of strong recurved canines at the symphysis.

Body gently tapering from the shoulders backward, and everywhere covered with minute scales.

Spinous dorsal originating above the posterior third of the adpressed ventrals; the length of its narrow base, including the small terminal membrane, is somewhat less than the length of the snout. Third dorsal spine longest, and filamentous; in the male it may extend to the eighteenth dorsal ray, its length being 2.1 in that of the body; in the female it sometimes reaches the sixth ray, and may be 3.87 in the body-length. Second dorsal rays gradually increasing to or nearly to the antepenultimate, the longest 2.2-2.8 in the head; membrane of the last ray narrowly united to the upper caudal ray. Anal originating below the second dorsal ray, and rather lower than that fin; the membrane of the last ray just reaches the base of the caudal. Median pectoral rays longest, extending to below the last dorsal spine, and 1.8-2.1 in the head. Ventrals inserted slightly in advance of the pectoral, as long as or a little longer than that fin. Middle caudal rays longest, 3.4-4.1 in the body-length.

⁶ The body is deeper in smaller examples than in larger ones owing to the gradual elongation of the tail with age. In a specimen 68 mm. long, the vent is nearer the base of the caudal than the end of the snout; in another measuring 105 mm., it is midway between those two points, while in a 136 mm. example it is one-fourth nearer the end of the snout.

Colour.—Blue-grey, the upper surface usually washed with brown and bearing a few small widely scattered black spots; lips, throat, and abdominal region bluish white. Many specimens have a number of short black cross-bars on the middle of the sides, which are most developed in specimens of medium size and tend to disappear in larger ones. Produced portion of the spinous dorsal blackish, the basal portion like the back and occasionally with a few small black spots. Soft dorsal brownish-blue, and sparsely spotted with black. Caudal bluish-grey, the inferior rays white, and with numerous black spots arranged in irregular transverse series. Anal and ventrals yellowish-white. Pectorals dark grey, with a broad lighter border and some black spots on the base.

Described from eight examples 68-140 mm. long from the Burnett River Heads; the figure represents one of these 136 mm. long.

Synonymy.—We have examined the eight co-types of *Gobiosoma guttulatum*, Macleay, and find them similar to the specimens described in all details; in Macleay's figure, the angulated muscle-bars are too pronounced, their appearance being exaggerated by contraction due to the effects of their preservative fluid. The type of *G. punctularum*, De Vis, cannot be found in the collection of the Queensland Museum; its brief description suggests that it is synonymous with *S. viridis*, the differences noted between it and *G. guttulatum* being apparently of little value. Castelnau's description of his *Apocryptes macrophthalmus* from Port Darwin leaves little doubt that that species also is synonymous with *S. viridis*.

Habits.—These little fishes frequent mud-flats and mangrove swamps, and so soon as the receding tide leaves the flats uncovered, they emerge from the holes in which they lie concealed during the prevalence of the flood. They traverse the mud with astonishing rapidity, their powerful pectoral, ventral and caudal muscles enabling them to leap and bound over its yielding surface in search of the small creatures on which they subsist. They can extrude or retract the eyes at will, and we are informed by Dr. Bancroft that they can partly raise themselves upon their ventral fins and tail so as to gain a wider outlook. He also notes that they hold the spinous dorsal fully erect when moving over the mud. Dussumier⁷ observed these fishes in the delta of the River Ganges, and wrote:—"They are abundant on the mud-flats, over which they skip in pursuit of small crustaceans; when an attempt is made to capture them they bury themselves with great celerity in the mud, or if that be too hard they hurriedly seek a crab-hole, in which to take refuge; when they are in the water they frequently raise the head above the surface." Referring to this latter peculiarity Dr. Bancroft writes:—"When pursued it skips into the water, swims a few feet, and then protrudes its head with its goggle-eyes thrust forth to their full extent; and from this point of vantage, it stares impudently at its would-be captor." Writing of an allied species, *Boleophthalmus pectinirostris*, Jordan⁸ says:—"The animal has the power of skipping along over the wet sands and mud, even skimming with great speed over the surface of the water. It chases its insect prey among rocks, leaves and weeds, and out of the water is as agile as a lizard."

⁷ Cuvier & Valenciennes—Hist. Nat. Poiss., xii., 1837, p. 213.

⁸ Jordan—Guide Study of Fishes, ii., 1905, p. 465.

According to Dussumier, the natives of Surat consume large quantities of these fishes in a salted or dried state, mixing them with boiled rice.

Locs.—Deception Bay and Burnett River Heads; coll. Dr. T. L. Bancroft. Other specimens are in the Queensland Museum from the estuaries of the Brisbane River, Pioneer River, Barron River, and the Ross River at Townsville. The co-types of *Gobiosoma guttulatum*, Macleay, were secured at Port Darwin, which is also the locality of *Apocryptes macrophthalmus*, Castelnau. Waite recorded the species from Broome and the Lennard River, North-Western Australia.

Distribution.—From the West Coast of India to the Malay Peninsula and the China Sea; New Guinea, North and North-Eastern Australia.

Subfamily GOBIINÆ.

The subfamilies Gobiinæ and Eleotrinæ have been regarded as well defined families by some authors, they being separated on the structure of their ventral fins. In the Gobiinæ, the ventrals are juxtaposed and usually united into a complete disc, which is generally supplemented by an anterior membrane connecting the spines; farther, the fifth rays are generally as long as the fourth. In the Eleotrinæ the ventrals are separate; there is no anterior membrane, and the fifth ray is shorter than the fourth. Were these characters constant, the subdivision of the two groups would present no difficulties, but in some species the ventral structures are more or less intermediate between the two types.

The highly specialised *Callogobius slateri*, which has hitherto been regarded as an Eleotrid, is very similar in all its major characters to the other species of the genus, but has eleotrid ventrals as defined above though there is a membrane connecting the bases of the inner rays; in *C. husseltii* the fourth ray is distinctly longer than the fifth, but the ventrals are otherwise of gobioid form. In *Zonogobius* the ventrals are completely united, but the fifth ray is shorter than the fourth; in the typical form *Z. semidoliatus*, there is no trace of an anterior membrane between the spines, but this structure is well developed in *Z. nuchifasciatus*. The ventrals of *Quisquilius eugenius* are similar to those of *Z. semidoliatus*, but it has been regarded as an Eleotrid by Jordan and his colleagues though Weber associates it with the Gobies.

These intermediate forms are few in number, however, and the greater mass of species of both groups are readily separable into one or the other section. Under these circumstances, it seems unnecessary to maintain separate families for the Eleotrids and Gobies, though they can be conveniently classified as subfamilies, distinguished by the complete or partial junction (Gobiinæ), or the complete separation of their ventral fins (Eleotrinæ).

Provisional key to the Australian genera and species known to the authors.

- a. Soft dorsal and anal long, partly united with the caudal; D. vi/38-48. Body anguilliform, naked. Eyes minute, teeth long and curved.
- b. Head with prominent raised papillose ridges.....*Leme*, spp.

- bb. Head without such ridges.....*Taenioides*, sp.
- aa. Soft dorsal and anal shorter, free from the caudal.
- c. Body naked, compressed and elevated.....*Gobiodon*, spp.
- cc. Body scaly.
- d. Chin and mandible with barbules, cheeks and opercles scaly.....
Parachaeturichthys, sp.
- dd. Chin and mandible without barbules
- e. First dorsal with 7-8 spines.....(*Gobius*) *pictus*.
- ee. First dorsal with 6 spines.
- f. Head with very prominent raised papillose ridges.....*Callogobius*, sp.
- ff. Head with only microscopic papillæ in rows.
- g. Opercles scaly, cheeks naked or scaly.
- h. Cheek scales large and distinct.....*Eryrias*, sp.
- hh. Cheek scales indistinct or wanting.
- i. Forty or more scales in a longitudinal row.....*Mugilogobius devisi*.
- ii. Less than forty scales in a longitudinal row.
- j. Head subcylindrical posteriorly, about as broad as deep.
- k. Scales of nape and operculum small.....*Mugilogobius galwayi*.
- kk. Scales of nape and operculum enlarged.....(*Gobius*) *flavescens*.
- jj. Head compressed, deeper than broad.....(*Gobius*) *australis*.
- gg. Opercles naked or nearly naked, cheeks naked.
- l. Exposed edge of shoulder-girdle with fleshy lobes.....*Awaous*, sp.
- ll. Exposed edge of shoulder-girdle smooth.
- m. Upper pectoral rays free and silk-like.
- n. Tongue truncate or rounded anteriorly.....*Gobius*, sp.
- nn. Tongue emarginate anteriorly.....*Maipo*, spp.
- mm. Upper pectoral rays not free nor differentiated from the others.
- o. Tongue deeply notched anteriorly.....*Glossogobius*, spp.
- oo. Tongue not deeply notched.
- p. Head subspherical, with spines or large papillæ.....*Paragobiodon*, sp.
- pp. Head longer, without spines or large papillæ.
- q. Scales larger, 36 or less in a longitudinal row.
- r. Nape and greater portion of neck naked.
- s. Gill-openings extending well forward below, fifth ventral ray shorter than the fourth.....*Zonogobius*, sp.
- ss. Gill-openings not extending forward below, fifth ventral ray as long as the fourth.
- t. Breast and pectoral base naked.....(*Gobius*) *lidwilli*.
- tt. Breast and pectoral base scaly.
- u. Caudal pointed, body longer.....(*Gobius*) *bifrenatus* and
(Gobius) semifrenatus.
- uu. Caudal rounded, body shorter.....*Rhinogobius*, spp.
- rr. Nape and neck scaly.
- v. Snout pointed, maxilla extending to below the orbital border.....
(Gobius) neophytus.
- vv. Snout obtuse, maxilla extending beyond the orbital border.....
(Gobius) lateralis.

- qq.** Scales smaller, more than 36 in a longitudinal row.
w. Mouth very large, maxilla produced backward toward the preoperculum.....*Waitea*, sp.
ww. Mouth normal, maxilla not specially produced.
x. About 15 dorsal and anal rays, snout tumid, caudal rounded.....*Amblygobius*, spp.
xx. 13 or less dorsal and anal rays, snout normal.
y. Scales minute, about 90 in a longitudinal row.....*Cryptocentrus*, sp.
yy. Scales larger.
z. Nape scaly.....*Oxyurichthys*, spp.
zz. Nape naked.....(*Gobius*) *eremius*.

Genus LEME, *De Vis.*

Leme, De Vis, Proc. Linn. Soc. N.S. Wales, viii., 1883, p. 286 (*L. mordax*, De Vis).

Body elongate, subcylindrical anteriorly, compressed posteriorly. It is wholly naked; lateral line defined by a groove along which are fleshy swellings on the tail portion. Head subquadrilateral, with raised ridges of papillæ radiating from the eye, on the cheeks, opercles and mandible. Eye obsolete. Mouth very oblique, with broad lobulate lips; mandible with barbles. An outer row of subulate teeth in each jaw, followed by a narrow band of villiform ones; no teeth on the palate. Tongue thick, rounded anteriorly, largely adnate to the floor of the mouth. Gill-openings broad, lateral, separated by a wide interspace; exposed edge of shoulder-girdle smooth. Four branchiostegals. One long dorsal fin, with six spines and about 38-48 branched rays, the last united with the caudal base. Anal similar to the soft dorsal. Pectorals well developed, with bifurcate rays. Ventrals united into a large disc, with one spine and five rays. Caudal well developed, pointed.

This genus is very near *Taenioides*, Lacepède, but differs in having prominent ridges of papillæ on the head.

- a.* About 48 dorsal rays; head about 9½ in total length.....*mordax*.
aa. About 37 dorsal rays; head about 7 in total length..*purpurascens*.

LEME MORDAX, *De Vis.*

(Plate xxxi., fig. 4.)

Leme mordax, De Vis, Proc. Linn. Soc. N.S.Wales, viii., 1883, p. 286.

D. vi/48; A. 46; P. 16; V. i/5; C. 15. Length to the vent 2.4 in the tail. Head, measured from the premaxillary symphysis to the upper angle of the gill-opening, 9.4 in the total length, and 1.8 in its distance from the vent. Depth before the ventrals 1.7, pectoral 3.2, and ventrals 1.2 in the head.

Head subquadrilateral, with raised ridges of papillæ which are disposed as in the accompanying illustration of *L. purpurascens*. Anterior nostril opening in a fleshy lobe behind the upper lip, the posterior a larger

pore before the eye. Eye minute, hidden in the skin on the upper surface of the head. Mouth subvertical, with broad lobate lips; lower jaw projecting. Mandible with three paired barbles increasing in size backward, and one almost between the median pair. An outer row of exposed subulate teeth in each jaw, which are largest towards the symphyses; these are followed by a band of villiform teeth which is widest anteriorly and narrows laterally; palate toothless. Gill-openings separated by a space equal to that between the posterior nostrils.

Body wholly naked, lacking even rudimentary scales. A lateral line is indicated by a groove upon which are large fleshy swellings on the tail portion. A small genital papilla.

Dorsal fin commencing above the end of the ventrals, the distance separating it from the gill-opening a little less than that between the latter point and the snout; the five anterior spines increase regularly in length, the sixth is shorter than the fifth and widely separated from the others; they are completely united with each other and with the rays by a thick membrane. Dorsal rays branched, increasing in length to about the middle of the fin, then decreasing backward; the last is united with the base of the caudal by membrane, but its tip forms a free lobe. Anal similar to the soft dorsal. Pectoral small, rounded, with branched rays. Ventrals large, completely united, with a broad basal membrane. Caudal pointed.

Colourless after long preservation in alcohol.

Described and figured from a specimen 218 mm. long, from Ripple Creek, Herbert River, Queensland, which is very close to the Murray River whence the typical example was obtained. It differs from *De Vis'* description in being wholly naked and in having branched rays in all the fins; the head is less than one-ninth of the total length instead of one-eighteenth, and there are no palatine teeth. Notwithstanding these discrepancies, it seems probable that the specimen is correctly identified as *L. mordax*.

Variation.—A second specimen from Cooktown, 190 mm. long, is very similar, but lacks the median mandibular barble. The head is one-tenth of the total length and it has vi/47 rays in the dorsal fin and 46 in the anal.

Locs.—Ripple Creek, Herbert River, and Cooktown, Queensland.

LEME PURPURASCENS, *De Vis*.

(Plate xxxi., fig. 3.)

Leme purpurascens, *De Vis*, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 698.

Gobioides purpurascens, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 36. *Id.*, Waite, Mem. N.S.Wales Nat. Club, ii., 1904, p. 46.

Amblyopus niger, *De Vis*, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 698.

D. vi/37; A. 36; P. 16?; V. i/5; C. 15? Length to the vent 1·8 in the tail. Head, without the mandible, 7 in the total length, and 1·6 in its distance from the vent. Depth before the ventrals 1·8, pectorals 3, and ventrals 1·09 in the head.

This species appears to differ from *L. mordax* principally in its proportions, and in having fewer dorsal and anal rays. The dorsal fin commences a little farther forward, and the median mandibular barbles are paired on each side.

The above proportions are those of a specimen 185 mm. long, from the Richmond River. The illustration is prepared from a small example 92 mm. long, from an unknown locality, in which the cephalic ridges are well preserved.

Synonymy.—We have examined the holotype of *Amblyopus niger*, De Vis, and find it quite similar to the specimens described and figured. It is much shrivelled and quite black, but has the cephalic ridges and other characters of *L. purpurascens*.

Locs.—Richmond River, New South Wales; coll. Mr. Thomas Temperley, 1887. Nowra, Shoalhaven River, New South Wales; coll. Mr. John Baxter.

Genus TÆNIODES, Lacepède.

TÆNIODES RUBRISTRIATUS, Kent.

Amblyopus rubristriatus, Kent, Proc. Roy. Soc. Qld., vi., 1889, pp. 223, 235, pl. xiii., fig. 5.

This briefly characterised species has not been recognised since it was first secured by Kent in the Cambridge Gulf, North-western Australia. It is perhaps incorrectly associated with *Tænioides*.

Genus GOBIODON, Bleeker.

Gobiodon, Bleeker, Nat. Tijdschr. Ned. Ind., xi., 1856, p. 407 (*Gobius histrio*, Cuv. & Val.).

Pseudogobiodon, Bleeker, Arch. Neer. Sc. Nat., ix., 1874, p. 309 (*Gobius citrinus*, Rüpp.).

Ellerya, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 95, and Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 21 (*E. unicolor*, Cast.).

General form short and compressed; body naked, but covered with a thick granular mucous, which when removed, may leave small pits in the skin resembling rudimentary scales. Head compressed, the profile rounded; mouth a little oblique, jaws subequal. Large tubular pores open between the nostrils, on the interorbital space, behind the eye, and around the preopercular border; lower margin of the preoperculum and mandible with minute papillæ. Teeth in a narrow band in each jaw, the outer row of which is largest; a few stronger inner teeth on each side of the mandibular symphysis. Tongue partly free, truncate or rounded anteriorly. Gill-opening opposite and as wide as the pectoral base, isthmus very broad; shoulder-girdle smooth. Dorsal with six spines and about eleven rays; anal similar to the dorsal. Ventrals small, cup-shaped. Caudal and pectorals rounded.

Synonymy.—*Pseudogobiodon citrinus* has been separated from *Gobiodon* because it has no canines. Though its inner enlarged mandibular teeth are smaller and less caniniform than in the typical species of *Gobiodon*, they are nevertheless similar in both structure and position, and we do not regard them as sufficiently characteristic to justify the maintenance of the genus. *Ellerya*, Castelnau, is inaccurately and superficially defined, but is evidently based upon a species of *Gobiodon* (see notes under *G. verticalis*).

Key to the Australian species.

- aa. First dorsal rounded, the fifth spine highest.
 - b. Colour lighter, usually with traces of five broad darker bars across the head and pectoral base; body very deep, head deeper than long.....*verticalis*.
 - bb. Colour darker; head uniform or with narrow blue lines across the sides and pectoral-base; body less elevated, head about as deep as long.
 - c. Head and pectoral-base with five light dark-edged lines.....*quinquestrigatus*.
 - cc. Head uniform or with indistinct lines.....*var. ceramensis*.
- aa. First dorsal angular, the anterior spines highest.
 - d. Head and pectoral base with four blue cross-lines.....*citrinus*.

Gobiodon verticalis, Alleyne & Macleay.

(Plate xxxii., fig. 2.)

? *Ellerya unicolor*, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 95.

Gobiodon unicolor, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 613.

Gobiodon verticalis, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 333, pl. xii., fig. 4. *Id.*, Macleay, *loc. cit.*, v., 1881, p. 612.

Pseudogobiodon verticalis, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 410.

Gobius douglasi, Kent, Great Barrier Reef, 1893, p. 310, pl. xvi., fig. 12.

D. vi/11; A. 10; V. i/5; P. 19; C. 17. Depth before the ventrals 2·2 in the length to the hypural joint; head 3·5-3·6 in the same. Eye 4·6-4·7 in the head, and subequal to its distance from the premaxillary symphysis; interocular space equal to the eye diameter. Caudal peduncle as deep as long. Breadth before the pectorals 2·6-2·7 in the height.

Head much deeper than long, greatly compressed; the profile of the snout is subvertical and the forehead and chin are very convex and equally rounded. Nostrils in low tubes, the posterior placed just before the eye, the anterior nearer the upper lip. A series of several large tubular pores extends around the preopercular border to behind the eye; two others are on the interorbital space, and a pair between the posterior nostrils. Microscopic papillæ are present on the lower preopercular border, and beneath the lower lip. Interocular space very convex. Mouth a little oblique, the jaws equal; maxilla extending backward to below the anterior half or the middle of the eye. Each jaw with a narrow band of teeth, the outer row of which is strong, the others villiform; an enlarged curved canine on each side of the mandibular symphysis. Gill-opening as wide as the base of the pectoral.

Body strongly compressed, naked; twenty-four myotomes are distinct in the preserved specimens between the axil and the hypural joint. Genital papilla large. The whole surface of the head and body is covered with a thick granular mucous which obscures the characters beneath it.

First dorsal commencing above the base of the pectoral. The spines are weak, and increase in length to the fifth; the sixth is separated from the fifth by a wide interspace, and is broadly united with the first ray by membrane. Soft dorsal rounded, all its rays except the first branched, the ninth longer than the postocular portion of the head. Anal commencing behind and terminating before the soft dorsal, to which it is similar in form. Caudal broadly rounded. Pectorals rounded, the median rays longest and reaching to below the third dorsal ray. Ventrals small, cup-shaped, with a broad basal membrane; their length is variable, the median rays reaching from half to three-fourths of their distance from the vent.

Colours.—Bleached after long preservation in alcohol, with only faint indications of the five broad darker cross-bars on the head and pectoral base, which are disposed as illustrated in the accompanying figure; there are also traces of about five irregular undulating longitudinal stripes on the body in some specimens. Opercular lobe with or without a dark spot.

Described from the six cotypes of the species, 39-46 mm. long, in the Macleay Museum. The figure represents a well preserved example 47 mm. long, from Green Island off Cairns.

Variation.—The brilliant green and scarlet colouration of this species in life is wholly lost in preserved specimens, and only occasionally are traces of the colour-marking retained. In some specimens from Murray Island, the broad dark bars on the head and base of the pectoral, which are usually indistinct or wanting, are well defined: the scarlet spots are represented by areas defined by microscopic grey dots, and may be irregularly distributed as in the figure or may coalesce to form more or less regular longitudinal lines. The dorsal and anal fin-rays vary from 11-12 and 10-11 respectively.

Synonymy.—The original description of *Ellerya unicolor*, Castelnau, is inaccurate and superficial, and although emended later by its author, is too general to allow of the species being definitely recognised without reference to the type. The specimens recorded by Macleay as *G. unicolor* from the Endeavour River do not differ from his cotypes of *G. verticalis*, and suggest that the two species are identical; if this be so, Castelnau's name will take precedence. Kent's figure of *Gobius douglasi* leaves no doubt as to the identity of that species with *G. verticalis*, and illustrates the characteristic brilliant colouration of the living fish. The similarity of the cotypes of *G. verticalis* and Cuvier & Valenciennes' figure of *G. histrio*⁹ is very striking, and the two species are very probably identical; but as we lack Bleeker's important paper on the synonymy of the several closely allied species of *Gobiodon*, we prefer to use Macleay's name until further details of the characters of *G. histrio* are available.

⁹ Cuvier & Valenciennes—Hist. Nat. Poiss., xii., 1837, p. 132, pl. cccxlvii.

Habits.—This brilliant little fish is not uncommon among the branches of living madrepores on the Queensland Coast. Macleay found specimens in the innermost recesses of dead coral at Darnley Island, where, he considered, they had probably been born, though this conclusion seems to be unwarranted. They are always covered with a very thick mucous in which are closely packed granules resembling ova, though their microscopic structure appears to differ from that of true eggs.

Locs.—Darnley Island, Torres Strait; cotypes of *G. verticalis*. Murray Island, Torres Strait; coll. Hedley & McCulloch. Endeavour River, Cooktown; Macleay Museum, as *G. unicolor* (Castl.), Macleay. Green Island, off Cairns. North West Island, off Port Curtis; coll. H. Burrell.

Gobiodon quinquestrigatus, Cuvier & Valenciennes.

(Fig. 4.)

Gobius quinquestrigatus, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 134.

Gobiodon quinquestrigatus, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 61. *Id.*, Weber, "Siboga" Exped., lvii., 1913, p. 454 (synonymy).

D. vi/11; A. 9; P. 18; V. i/5; C. 17. Depth before the ventrals 2.8 in the length to the hypural joint; head 3.5 in the same. Eye 4 in the head and subequal to the snout; interocular width 1.3 in the eye. Depth of the caudal peduncle 1.2 in its length. Breadth before the pectoral base 2.1 in the height.

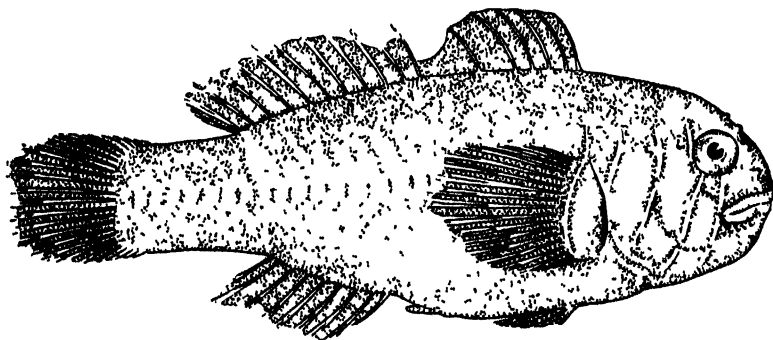


Fig 4 *Gobiodon quinquestrigatus*.

Head longer than deep, compressed; upper profile very convex, chin prominent. Nostrils tubular, the posterior placed just before the eye. A series of six large tubular pores extends around the preopercular border to behind the eye; two others are on the interorbital space, and a pair between the nostrils. Microscopic papillæ are present on the lower preopercular margin, beneath the eye, and around the mouth to below the lower lip. Interorbital space a little convex. Mouth slightly oblique, the maxilla extending to below the anterior half of the eye; mandible not quite so long as the upper jaw. Each jaw with a narrow band of villiform

teeth, and an outer row of stronger ones; one or two inner canines are present on the mandibular symphysis. Gill-opening slightly narrower than the pectoral base.

Body strongly compressed, naked. About twenty-three vertical series of minute pores, arranged along the median line between the axil and the hypural joint, represent the lateral line. Genital papilla large.

Fins largely damaged. First dorsal commencing a trifle behind the base of the pectoral; the spines are weak, the fifth apparently highest, and the sixth separated by a wide interspace from the fifth. Membrane connects the last spine with the basal portion of the first ray. Dorsal rays branched, the last double. Anal, caudal and pectorals with branched rays. Ventrals small, cup-shaped, with a broad basal membrane, and originating behind the pectoral base.

Colour.—Brown in alcohol, the head a little lighter than the body. Two light narrow lines with darker borders extend across the cheek from the eye to the lower surface of the head; another short one is present behind the eye; two longer curved ones cross the opercles from the side of the neck, and another extends across the base of the pectoral. Fins somewhat darker than the body, the soft dorsal with an indefinite light basal stripe.

Described and figured from a specimen $28\frac{1}{2}$ mm. long without the caudal fin.

Loc.—Cairns Reef, off Cooktown, Queensland; coll. A. R. McCulloch.

Gobiodon quinquestrigatus, var. CERAMENSIS, Bleeker.

Gobius ceramensis, Bleeker, Nat. Tijd. Ned. Ind., iii., 1852, p. 704.

Gobiodon ceramensis, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 88, and Fische Südsee, vi., 1877, p. 182, pl. cix., fig. d. *Id.*, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 333. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxxi., 1879, p. 384. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 409.

Proportions of a specimen 34 mm. long, from Murray Island. Depth before the ventrals 2·7 in the length to the hypural joint; head 3·4 in the same. Eye 4·1 in the head, and equal to the snout and the interorbital space. Caudal peduncle as deep as long. Breadth before the pectorals 2·6 in the height. Median dorsal spines 2·2, median dorsal rays 1·6, seventh anal ray 1·5 in the head. Pectoral 1·2, caudal 1·3 in the head.

Five specimens 29-34 mm. long, taken together at Murray Island, are brown in colour, the head and thoracic region being lighter. Cross-lines on the head as in the typical form may be traceable, but are usually wanting. The fins are similar to or darker than the body.

This variety differs from the typical form only in being more uniformly coloured, the head markings being usually absent.

Locs.—Murray Island, Torres Strait; coll. Hedley and McCulloch. Darnley Island, Torres Strait; Macleay Museum Collection.

Klunzinger has recorded this variety from Port Denison.

Gobiodon citrinus, Rüppell.

Gobius citrinus, Rüppell, Neunewirbelth. Fisch., 1838, p. 139, pl. xxxii., fig. 4.

Gobiodon citrinus, Klunzinger, Verh. Zool. Bot. Ges. Wien, 1871, p. 40. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 87, and Fische Südsee, vi., 1877, p. 181, pl. cix., fig. e. *Id.*, Day, Fish. India, 1876, p. 298, pl. lxiv., fig. 2. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 613.

Pseudogobiodon citrinus, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 410.

D. vi/11; A. 10; P. 19; V. i/5; C. 17. Depth before the ventrals 2·3 in the length to the hypural joint; head 3·1 in the same. Eye 3·8 in the head, shorter than its distance from the premaxillary symphysis; interocular space a trifle wider than the eye. Caudal peduncle a little deeper than long. Breadth before the pectorals 2·06 in the height.

Head deeper than long, compressed; the profile of the muzzle obtusely rounded, the upper and lower surfaces evenly oblique. Nostrils in low tubes, the posterior in front of the eye, the anterior nearer the upper lip. Several large pores are arranged around the preopercular border and behind the eye; two others are on the interorbital space, and a pair between the nostrils. Microscopic papillæ are present on the lower preopercular border and beneath the lower lip. Interocular space nearly flat. Mouth a little oblique, jaws subequal; maxilla extending backward to below the anterior portion of the eye. Each jaw with a narrow band of villiform teeth, some of the outer ones being a little enlarged; three inner subcaniniform teeth on each side of the mandibular symphysis. Gill-opening narrower than the base of the pectoral.

Body strongly compressed, naked; together with the head and fins, it is covered with a thick granular mucous which obscures the characters beneath it. Genital papilla large.

First dorsal commencing above the end of the opercle; the anterior spine highest, the others decreasing evenly backward; the last is separated by a wide interspace from the fifth, and is united with the base of the first ray by membrane. Soft dorsal rounded, and longer than high; all the rays except the first are branched, and the median ones are much longer than the postorbital portion of the head. Anal commencing behind, and terminating before the soft dorsal; the rays increase in length to the eighth, which is longer than the base of the fin. Caudal rounded. Pectoral rounded, reaching to below the sixth dorsal ray. Ventrals with a broad basal membrane, the median rays reaching the vent.

Colour.—Brown in alcohol, with four pale dark-edged lines on the head and thoracic region; two extend through the eye, the first to behind the mouth, and the second across the cheek; the third descends from the upper surface of the neck to cross the end of the operculum, and the fourth from the shoulder across the base of the pectoral. The opercular lobe bears a distinct black spot. Pale dark-edged lines extend along the bases of the dorsal and anal fins. Fins dark brown; the first dorsal has

a black edge followed by a lighter inner border, which marking is also present, though less distinct, on the second dorsal and upper and lower margins of the caudal.

Described from a well preserved specimen, 48 mm. long, from Murray Island.

Variation.—Two smaller specimens, 32 mm. long, which were taken with the example described, are lighter in colour, the general tint being yellowish, though their markings are similar; the first dorsal is markedly angular owing to the greater length of the anterior spines, and the pectorals are longer and more pointed; the eye also is proportionately larger. Another specimen 40 mm. long, is intermediate between the two extremes.

Locs.—We have examined a series of ninety-six specimens in the Australian Museum from the following localities. Murray Island, Torres Strait; coll. Hedley & McCulloch. Samoa; Jordan & Seale Coll. New Hebrides; coll. Cummins & Stevens. Solomon Islands. Nicobar Islands; Dr. Francis Day's Coll. Seychelles; exch. Paris Museum.

Macleay recorded this species from the Endeavour River estuary, North Queensland.

Genus *PARACHAETURICHTHYS*, Bleeker.

Parachaeturichthys, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 325 (*Chaeturichthys polynema*, Bleeker). *Id.*, Jordan & Snyder, Proc. U.S. Nat. Mus., xxiv., 1902, p. 103.

Body moderately compressed; scales large, ctenoid on the body, cycloid on the nape and breast. Head not depressed, cheeks and opercles with cycloid scales; cheeks with horizontal series of mucigerous pores. Eyes superolateral; interorbital space not wide. Mouth moderate, oblique; jaws equal, the lower with small barbles. Each jaw with a band of villiform teeth, and an outer series of enlarged teeth anteriorly. Tongue with the tip free and rounded. Gill-openings not continued forward below; isthmus wide. Inner edge of shoulder-girdle smooth. Dorsal fins short, the spines not produced, with vi, 10 rays; anal similar to the soft dorsal, with i, 9 rays. Caudal long and pointed. Pectorals pointed, with 21-22 rays, none free or silk-like. Ventrals united, free from the abdomen.

PARACHAETURICHTHYS POLYNEMA, Bleeker.

Chaeturichthys polynema, Bleeker, Verh. Batav. Gen., xxv., 1853, Japan p. 44, fig. 4.

Gobius polynema, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 46. *Id.*, Day, Fish. India, 1876, p. 286, pl. lxi., fig. 8.

Parachaeturichthys polynema, Bleeker, Verh. Akad. Amst., xviii., 1879, Japan p. 19. *Id.*, Jordan & Seale, Proc. U.S. Nat. Mus., xxiv., 1902, p. 103.

D. vi/1,10; A. i,9; P. 21. 28 scales along the middle of the body, and 8 between the anterior dorsal and anal rays.

Depth of the body 5.33 in its length, and 1.4 in the head. Head 3.83 in the length of the body, its width 1.63 in its length. Eye 3.67 in the head, one-fifth longer than the snout, which is 4.5 in the head; interorbital space three-fifths of the eye-diameter. Caudal peduncle about five-eighths longer than deep, its depth 8.5 in the body-length. Fourth dorsal spine 1.77 in the head, pectoral a trifle shorter than the head. Caudal 2.57 in the body-length.

Head a little wider than deep, and wider than the body, its fronto-occipital profile feebly rounded, that of the nape linear. Cheeks and opercles covered with large cycloid scales. Cheeks with three horizontal series of mucigerous pores; parietal groove with two open pores, the anterior very large and elliptical, the posterior rounded; hinder limb of preoperculum with three open pores. Eye large, longitudinally elliptical; interorbital region moderate, concave. Snout short and blunt, with a rounded and strongly acclivous profile. Jaws equal, the maxilla extending to below the middle of the eye; lower surface of the head with about three pairs of short barbles inserted below the posterior half of the mouth. Each jaw with a band of villiform teeth, the exterior row on the sides of each premaxillary being a little enlarged; an outer row of strong, curved, subulate teeth anteriorly in each jaw, the posterior larger, and subcaniniform on each side of the mandible. Tongue with the tip free and rounded. Gill-openings not continued forward below, separated by a wide isthmus; exposed edge of shoulder-girdle entire.

Body slender, compressed, the dorsal contour slightly more arched than the ventral. It is covered with large ctenoid scales, which become cycloid on the nape and breast.

First dorsal originating well behind the pectoral base; its spines are low, and its outline rounded; fourth spine longest, about as long as the base of the fin and not reaching the second dorsal when depressed. Outer border of second dorsal linear, the rays gradually increasing in length to the penultimate; this is much longer than the last, once and a half as long as the fourth spine, and three-fourths as long as the base of the fin. Anal commencing below the second and terminating below the ninth dorsal ray; the penultimate ray is longest, but shorter than that of the dorsal, 1.3 in the basal length of the fin, which is 3.7 in the body-length. Pectoral pointed, the middle rays longest, and extending to below the origin of the second dorsal. Ventral inserted a little in advance of the pectoral base, three-fourths as long as the pectorals, and not reaching the vent. Caudal long and pointed.

Colour-marking.—Brown, darkest above. The fins are darker, and the upper caudal rays have a large elliptical blackish yellow-edged ocellus near the base.

Described from two examples, 108-120 mm. long, in the Queensland Museum.

Locs.—Somerset, North Queensland; coll. Kendall Broadbent. An Indian example from Bombay, in the Australian Museum, was identified by Dr. Day.

Distribution.—Eastern coast of India to China and Southern Japan. North-eastern Australia.

(GobiUS) HINSBYI, Johnston.

(Plate xxxiii., fig. 1.)

Gobius pictus, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 124 (Not *G. pictus*, Malm, 1863). *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 599. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 28.

Gobius hinsbyi, Johnston, Proc. Roy. Soc. Tasm., 1902 (1903), abstract p. x.—*Nomen nudum*.

D. vii/9; A. 9; P. 19; V. i/5; C. 13. 50 rows of scales between the axil and the hypural joint, and about 15 between the anterior dorsal and anal rays.

Depth before the ventrals 5·4 in the length to the hypural joint; head 3·5 in the same. Eye 4 in the head, a little shorter than the snout which is 3·3 in the head. Depth of the caudal peduncle 3·3 in the head. Breadth before the pectorals 1·08 in the depth.

Head subcylindrical, about as deep as broad. Operculum covered with small scales, and a few are present on the cheeks, but they are more or less completely hidden in mucous. Rows of mucigerous papillæ extend across the cheeks and opercles, and around the preopercular border. Some open pores are present on the interorbital region, around the eye, and along the nuchal groove. Eyes close together, the interorbital space being a narrow ridge. Snout convex, obtusely conical. Nostrils rather close together, the anterior in a short tube midway between the eye and the preorbital, the posterior a simple opening. Mouth a little oblique, the mandible a little shorter than the upper jaw; the maxilla reaches to below the posterior nostril. Teeth subequal in size, in three or four rows in the anterior part of each jaw which are reduced to one or two as they extend backward. Tongue rounded and free anteriorly. Gill-openings continued well forward below, and separated by a narrow isthmus which is much narrower than the eye. Exposed edge of the shoulder-girdle smooth.

Body robust, subcylindrical anteriorly, compressed posteriorly. The scales are small and ctenoid, and extend forward to the nape behind the eye; they also cover the breast and the base of the pectoral, where they are smaller and cycloid. Caudal peduncle more than three times as long as deep. Genital papilla large and pointed.

Dorsal fin originating above the anterior half of the pectoral; it is rounded, and the third spine is longest but does not reach the second dorsal when adpressed. Dorsal rays increasing in length backwards, the second about equal to the length of the base of the fin, and a little higher than the longest spine. Anal opposite the second dorsal and of similar

form. Pectorals rounded, reaching to about midway between the two dorsal fins. Ventrals larger than the pectorals, with a broad basal membrane, and reaching to the origin of the anal. Caudal feebly rounded.

Colour-marking.—Light olive on the back, whitish on the sides and under surfaces; the upper parts are closely freckled with grey dots and lines, which unite to form about five darker cross-bars on the back. The middle of the sides bear five darker blotches formed of black dots, the most pronounced of which is at the base of the tail. The sides are vertically barred with about thirteen grey stripes, which are most pronounced anteriorly. A dark stripe extends from the eye to the preorbital, and another descends across the operculum. First dorsal with many small grey dots between the rays; on the second they tend to form larger spots. Caudal and pectoral with transverse rows of grey spots on the rays. Anal and ventral colourless.

Described and figured from a specimen 86 mm. long, from Wedge Bay, Tasmania.

Variation.—A series of twenty-five specimens, 33-62 mm. long, taken with the larger example described, exhibits considerable variation in the colour-marking, and in the numbers of spines and rays in the vertical fins. The vertical transverse bars may be either wholly wanting, or they may be even more distinct and more regularly arranged than illustrated, and they sometimes meet on the dorsal and ventral surfaces so as to form complete annuli around the body. The lateral blotches vary in their intensity, and are sometimes much larger than in the figured specimen, particularly in those which lack the vertical bars. In six examples we count D. viii/11-12; A. 11-12 instead of vii/9 and 9 as described above.

Identity and synonymy.—These specimens agree with Castelnau's description in most details, and the fact that they have eight dorsal spines leaves little doubt that they are correctly identified as *G. pictus*. The type of *G. hinsbyi* is preserved in the Tasmanian Museum, and has been examined by one of us; though in a very bad state of preservation, it leaves no doubt as to its identity with the specimen described above.

Loc.—Wedge Bay, Hobart, Tasmania, 5-10 fathoms; coll. C. Hedley, April, 1917. Queenscliff, Port Phillip, Victoria; coll. E. R. Waite, 1905.

GENUS CALLOGOBIOUS, Bleeker.

Callogobius, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 318 (*Eleotris hasseltii*, Bleeker). *Id.*, Weber, "Siboga" Exped., lviii., 1913, p. 479. *Id.*, McCulloch, Proc. Linn. Soc. N.S. Wales, xl., 1915, p. 271.

Mucogobius, McCulloch, Rec. W. Austr. Mus., i., 1912, p. 93 (*Gobius mucosus*, Günther).

Body subcylindrical anteriorly, compressed posteriorly; scales of moderate size, largest posteriorly; they are mostly cycloid, but more or less ctenoid posteriorly; they extend forward almost to the eyes on the upper surface of the head, and cover the breast and base of the pectoral. Head with a few scales on the upper part of the operculum, and others

scattered on the cheek; numerous upraised rows of papillæ are arranged regularly on all surfaces of the head, and along the middle of the sides. Snout obtuse, mandible projecting. Mouth oblique; no barbles. Several rows of small, subequal teeth in each jaw anteriorly; palate toothless. Tongue rounded and free anteriorly, slightly emarginate on the median line. Gill-openings lateral, separated by a broad isthmus; exposed edge of shoulder-girdle smooth. Pseudobranchiæ present; gill-rakers of first arch short, thick, and few in number. First dorsal rounded, with six spines; second dorsal with ten to eleven rays. Anal similar to the second dorsal. Pectoral large, rounded. Ventrals $1/5$, either completely united or with only a narrow membrane connecting the bases of the inner rays; anterior interspinous membrane present or absent. Caudal elongate, obtusely pointed.

CALLOGORBIUS HASSELTII, Bleeker.

Eleotris hasseltii, Bleeker, Nat. Tijdschr. Ned. Indie, i., 1851, p. 253, and xi., 1856, p. 412. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 116.

Eleotriodes hasseltii, Bleeker, Act. Soc. Sc. Indo-Neerl., vi., 1859, p. 112, and Ned. Tijds. Dierk., ii., 1865, p. 150.

Valenciennesia hasseltii, Bleeker, Versl. Akad. Amsterdam (2), ii., 1868, p. 300.

Callogobius hasseltii, Weber, "Siboga" Exped., lvii., 1913, p. 480, fig. 98, and Nova Guinea, ix., 4, 1913, p. 601.

Identity.—Bleeker's description of the species appears to have been incomplete, so we rely upon Weber's notes and figure for the identification of our specimens as *C. hasseltii*. They agree with his illustration in all details, and exhibit the same variation in their colour-marking as noted by him.

We are unable to detect any differences between specimens from tropical waters (*C. hasseltii*) and many others from southern Australian coasts (*C. mucosus*) by which they may be definitely distinguished as two species. Northern examples are usually more conspicuously marked than those from the south, and generally have more of the posterior scales ctenoid. But both characters are variable, and overlap in examples from intermediate localities, so we recognise the southern specimens as a variety of *C. hasseltii* only.

Locs.—Masthead Island off Port Curtis, and Cairns Reef off Cooktown, Queensland; coll. McCulloch. Two Isles off Cape Bedford, Queensland; coll. Hedley and Briggs. New Hebrides; coll. Cummins and Stevens.

CALLOGORBIUS HASSELTII, var. *MUCOSUS*, Günther.

(Plate xxxii., fig. 4.)

Gobius mucosus, Günther, Proc. Zool. Soc., 1871, p. 663, pl. lxvii., fig. A. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 609. *Id.*, Waite, Rec. Austr. Mus., vi., 1906, p. 200.

Gobius depressus, Ramsay and Ogilby, Proc. Linn. Soc. N.S.Wales (2), i., 1886, p. 4. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 35. *Id.*, Waite, Mem. N.S.Wales Nat. Club, ii., 1904, p. 46.

Mucogobius mucosus, McCulloch, Rec. W.Austr. Mus., i., 1912, p. 93.

D. vi/11; A. 9; P. 16; V. i/5; C. 16. About 37 scales between the axil and the hypural joint, and 17 between the anterior dorsal and anal rays.

Depth 5·7 in the length to the hypural joint; head 3·9 in the same. Eye slightly shorter than the snout, which is 3·5 in the head. Interorbital space about 4 in the eye. Breadth between the pectoral bases equal to the depth. Depth of the caudal peduncle 2, pectoral 1 in the head.

Head largely naked, with a few scales on the upper portion of the operculum, and one or two very indistinct ones between the mucigerous ridges on the cheeks. All surfaces of the head bear raised lines of papillæ which are regularly arranged and disposed as shown in the accompanying illustration; in addition, series of small pores extend around the eye and preopercular margin. Eyes close together, superolateral, separated by a narrow bony interorbital area. Snout obtuse and rounded. Nostrils tubular. Mouth very oblique, the maxilla not reaching the vertical of the anterior margin of the eye. Mandible projecting beyond the upper jaw; its lower surface with numerous mucigerous ridges. A band of small pointed teeth in each jaw, which is three or four rows wide anteriorly, and becomes gradually narrower laterally; the outer teeth are slightly larger than the others. Palate toothless. Tongue rounded, slightly notched in the middle line, and largely free. The space between the gill-openings is twice as wide as the eye; exposed edge of the shoulder girdle smooth and sharp.

Body subcylindrical anteriorly, compressed posteriorly. It is covered with moderately large cycloid scales, which increase in size backwards, a row along the median line of the caudal half being slightly larger than the others; the scales extend forward on the nape to just behind the eyes, and cover the breast and base of the pectoral fin. Vertical series of mucigerous papillæ extend backward from behind the pectoral to the caudal base, between which some horizontal rows are interspersed. Genital papilla well developed.

First dorsal low and rounded, the fifth spine subequal to the post-orbital portion of the head. Dorsal rays increasing in height to the penultimate, which reaches backward to the upper caudal rays. Anal of similar form to the second dorsal, but shorter and slightly lower. Pectoral large and rounded, not quite reaching the vertical of the vent. Ventrals inserted before the pectoral, completely united, and reaching about two-thirds of their distance from the vent. Caudal elongate, obtusely pointed.

Colour.—Brown, each scale with a darker border, and a lighter median band along the middle of the sides posteriorly. Some indefinite broad, darker cross-bands are present on the back and sides; one descends from the base of the spinous dorsal, a second narrower one from the anterior dorsal rays, and a third broad one from the hinder portion of the soft dorsal; two others are present in front of the dorsal fin. The vertical

fins are dark, with some still darker spots on the rays; the anal has a light border. Pectorals and ventrals light coloured, the former with grey spots.

Described and figured from a specimen 85 mm. long from Port Jackson.

Variation.—A large number of specimens from Port Jackson, South and South-west Australia, prove this form to be variable in colour; the southern specimens are very dark with their markings obscurely defined, while those from Port Jackson and South-west Australia are often lighter and more or less conspicuously banded. The scales near the caudal fin are generally cycloid, but are sometimes markedly ctenoid; those on the operculum and cheek are often very rudimentary and sometimes wholly wanting. A most critical comparison of these specimens fails to discover any character by which they may be definitely distinguished from the typical *C. hasseltii* of tropical waters.

Locs.—We have examined over one hundred specimens from the following localities:—Port Jackson and the neighbouring coast; including the holotype of *Gobius depressus*, Ogilby. Port Phillip, Victoria; coll. C. J. Gabriel. South Australia, various localities. South-western Australia; coll. A. Abjornssen.

CALLOGOBIUS SCLATERI, Steindachner.

(Plate xxxii., fig. 3.)

Eleotris sclateri, Steindachner, Sitzb. Akad. Wiss. Wien, lxxx. i., 1880, p. 157.

Gobiomorphus sclateri, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 384, fig. 73.

D. vi/10, A. 9; P. 17; V. i/5; C. 15. About 31 rows of scales between the axil and the hypural joint, and about 13 between the anterior dorsal and anal rays.

Depth before the ventrals 4·6 in the length to the hypural joint; head 3·4 in the same. Eye as long as the snout, 4·4 in the head; interorbital space 2·5 in the eye. Depth of the caudal peduncle equal to half the length of the head. Breadth before the pectorals 1·1 in the depth.

Head depressed, broader than deep. The cheeks and opercles are completely covered with large scales, which are usually hidden in thick mucous. The whole head bears upstanding ridges of mucigerous papillæ, which are regularly arranged as illustrated in the accompanying figure. Eyes superolateral, separated by a narrow concave interorbital space. Nostrils close together, tubular, the anterior overhanging the upper lip. Snout depressed, the lower jaw much longer than the upper; mouth oblique, the maxilla not quite reaching the vertical of the orbital margin. An outer series of enlarged conical teeth in the premaxillaries, followed by a narrow band of villiform ones; in the mandible the larger teeth are present anteriorly only, and the villiform ones are somewhat larger on the sides of the jaw. Tongue free and rounded anteriorly. Gill-openings lateral, about as broad as the isthmus separating them. Exposed edge of the shoulder girdle smooth.

Body robust, compressed posteriorly. It is covered with large strongly ctenoid scales, which completely cover the nape, bases of the pectorals, breast and abdomen; they are largest posteriorly, and the hinder ones of the median row on the caudal peduncle are larger than the others. Caudal peduncle very broad and compressed. Genital papilla small.

First dorsal fin originating over the anterior half of the pectoral; the second to fourth rays are subequal in length, and the latter reaches the origin of the second dorsal when adpressed. Dorsal rays increasing slightly in length to the penultimate, which is about as long as the spines. Anal opposite to, and of similar form to the second dorsal, but with a shorter basal length. Pectorals obtusely pointed, the median rays reaching to the vertical of the anterior dorsal ray. Caudal broadly rounded. Ventral fins united at their base by a narrow membrane; the rays increase in length to the fourth, but the fifth is much shorter.

Colour-marking.—Light brown in alcohol, with broad darker brown cross-bands; one of these is placed below each dorsal fin and one across the caudal peduncle, and they have numerous irregular dark markings between them. The cross-bands extend onto the dorsal fins where they break up into irregular dark marblings. Pectorals, caudal, and anal with irregular dark cross-bars, the base of the former with two darker stripes.

Described and figured from a specimen 47 mm. long, from Two Isles, North Queensland.

Variation.—A series of over one hundred specimens 23-56 mm. long, exhibits some variation in the details of the colour-marking, which is much more pronounced and more variegated in some specimens than in others. The mucigerous system of the head is as well developed in the youngest as in the largest specimens, and the ridges are similarly arranged.

This species has been associated with *Gobiomorphus*, Gill, by Jordan and Seale, but it differs from that genus in the great development of the cephalic mucigerous system. This character distinguishes it from all other genera known to us except *Callogobius*, from the typical species of which it only differs in the structure of its ventral fins. In *C. hasseltii*, these are truly gobioid in form, having a distinct though narrow basal membrane uniting the spines; the fifth rays are slightly shorter than the fourth, but are united by membrane to their tips: in *C. sclateri* the ventrals have no anterior basal membrane connecting the spines; the inner rays are much shorter than the others, and are connected by membrane only at their extreme bases. There being no other major differences between them, it seems probable they are congeneric.

Loc.—We have examined specimens from Two Isles, near Cape Bedford, North Queensland; coll. Hedley and Briggs, August 1916. New Hebrides, Solomon Islands, and Fiji; coll. Cummins and Stevens.

Genus *EXYRIAS*, Jordan & Seale.

Ezyrias, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 405 (*Gobius puntangoides*, Bleeker).

Body elliptical and compressed, the caudal peduncle short and deep; head deeper than wide, with a short acclivous snout, the cheeks not

swollen. Body covered with large ctenoid scales; cheeks, opercles, and occiput scaly; cheeks with mucigerous canals between the series of scales. Mouth oblique, the jaws equal. Teeth in narrow bands in each jaw; the outer row is enlarged and conical in the premaxillaries, the others villiform; anterior mandibular teeth enlarged, with a short canine on each side. Tongue free and broad, with a feebly emarginate tip. Eyes superolateral and anteromedian, the interspace narrow. Isthmus wide; the exposed edge of the shoulder girdle smooth. Dorsal with about vi, i/10 spines and rays, the spines flexible and more or less produced. Anal with i/9 rays, similar to the second dorsal. Pectoral large and obtusely pointed, without free silk-like rays. Ventrals with i/5 rays. Caudal cuneiform or rounded.

Exyrias is very probably identical with *Gnatholepis*, Bleeker, but we retain it on account of the great development of the mucigerous canals of the cheeks, which separate the cheek-scales into three distinct groups. In *Gnatholepis* these canals are scarcely if at all developed, and the squamation of the cheeks is much less definite. In all other characters the two genera are apparently identical.

EXYRIAS PUNTIANG, Bleeker.

Gobius puntang, Bleeker, Nat. Tijdsch. Ned. Ind., ii., 1851, p. 486. *Id.*, Day, Fish. India, 1876, p. 288, pl. lxii., fig. 1.

Gobius puntangoides, Bleeker, *Loc. cit.*, v., 1853, p. 242. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 19, and Fisch. Sudsee, v., 1877, p. 171, pl. cviii., fig. a.

Gobius andamanensis, Day, Proc. Zool. Soc., 1870, p. 691.

Gobius maculipinnis, Macleay, Proc. Linn. Soc. N.S.Wales, viii. 2, 1883, p. 267.

Gobius concolor, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 689.

Awaous puntangoides, Seale, Occ. Pap. Bishop Mus., iv., 1906, p. 84.

Exyrias puntangoides, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv, 1906, p. 405.

Gnatholepis maculipinnis, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 395.

Exyrias puntang, Jordan & Richardson, Check-list Fish. Philipp. Arch., 1910, p. 49.

Gobius (Gnatholepis) puntangoides, Weber, Abh. Senck. Nat. Ges., xxxiv., 1911, p. 43.

D. vi, i/10; A. i/9; P. 17; V. i/5; C. 17. Twenty-eight series of scales along the middle of the body, and nine between the origins of the soft dorsal and the anal.

Depth of the body 3·7 in its length, and a little less than the length of the head; head 3·6 in the body-length, two-sevenths deeper than wide, its width 1·6 in its length. Eye 4 in the head-length, shorter than the snout, which is 2·6 in the head; interorbital space about half as wide as the eye. Caudal peduncle one-fourth longer than deep, its least depth 6·4 in the body length. Width of the body 1·5 in its depth.

Snout rounded, the profile acclivous. Interorbital region grooved. Jaws equal, the maxillary extending to below the anterior third of the eye. Cheek-scales well developed, about half as large as those of the body; they are arranged in three series consisting respectively of 1, 2, 2 rows, which are separated from one another by two horizontal mucigerous grooves. Scales of the operculum and occiput but little smaller than those of the body. A large median open pore between the anterior borders of the eyes. Jaws with narrow bands of villiform teeth, the outer premaxillary series enlarged and conical: mandible with a moderately strong curved canine at each outer angle, between which the outer series is enlarged; beyond the canines the villiform band extends to the corner of the mouth without enlarged teeth.

Body moderately robust, the dorsal contour evenly rounded from the frontal region to the caudal peduncle, and much more arched than the ventral. Caudal peduncle short and stout. Scales ctenoid; predorsal scales in eleven series, extending forward to between the posterior borders of the pupils.

First dorsal fin originating above the pectoral base, the spines slender and flexible; the second is the longest, reaching well beyond the first ray when adpressed, and one-fifth longer than the head. Margin of the second dorsal straight, the rays gradually increasing in length to the last, which, with the penultimate, is somewhat produced and forms an acute angle which overlaps the caudal-base; its length is one-fourth less than that of the second spine. Anal commencing slightly behind the vertical of the first dorsal ray; the penultimate ray is longest, and a little longer than the basal length of the fin. Pectoral obtusely pointed, the eighth ray longest and extending to below the third dorsal ray, and a little longer than the head. Ventrals inserted below the pectoral-base, and equal in length to five-sixths of its longest ray; it reaches to the vent.

Colour.—Bleached after long exposure to the light. According to De Vis, this specimen was brown in colour, with the abdomen paler, and there were traces of narrow vertical bands. The first dorsal had two longitudinal rows of brown spots, and the pectorals and ventrals were dark brown.

The above description is based principally upon the holotype of *Gobius concolor*, De Vis, which is 87 mm. long from the snout to the base of the caudal rays. It is preserved in the Queensland Museum, but is badly mutilated, the soft dorsal, caudal, and anal fins having been broken off short. De Vis described the upper pectoral rays as detached and silky, but this is incorrect.

Synonymy.—An example 123 mm. long, labelled as *Gobius puntang*, from the Andaman Islands, which was one of Dr. Day's collection, is preserved in the Australian Museum. Another, the holotype of *G. maculipinnis*, Macleay, is also in the Australian Museum collection, and does not differ from the Indian specimen; Macleay counted seven spines in the first dorsal fin, but there are only six.

We regard *Gobius puntang*, Bleeker and *G. puntangoides*, Bleeker, as synonymous. There are some discrepancies in the various accounts of the two species, but they do not appear to call for much attention. In his

earlier description, Günther states that *G. puntangoides* is without canines and has the eyes close together, while later he recognised small canines and described the eyes as about one diameter apart. Day described and figured the maxillary as reaching to below the middle of the eye, whereas in our specimens, as in those of Bleeker and Günther, it does not extend so far.

Locs.—Cape York, Queensland; type of *Gobius concolor*, De Vis. Normanby Island, D'Entrecasteaux Group; type of *G. maculipinnus*, Macleay. Andaman Islands; Dr. Day's collection.

Distribution.—From the Andaman Islands, through Malaysia, to North-eastern Australia, the Solomon Islands and the Caroline Islands.

Genus MUGILOGOBIUS, Smitt.

Mugilogobius, Smitt, Ofv. Ak. Forh., 1899, p. 552 (*Utenogobius ubei*, Jordan & Snyder).

Key to the Australian species.

- a. 41-47 scales between the axil and the hypural *devisi*.
 aa. 31 scales between the axil and the hypural. *galwayi*.

MUGILOGOBIUS DEVISI, nom. nov.

(Plate xxxvi., fig. 2.)

Gobius stigmaticus, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 686 (Not *Smaragdus stigmaticus*, Poey, = *Gobius*¹⁰).

D. vi/10; A. 9; P. 16; V. i/5; C. 16. 40-47 rows of scales between the axil and the hypural joint, and 13-17 between the anterior dorsal and anal rays¹¹.

Depth of the body before the dorsal fin 4.1 in the length to the hypural joint; head 3.3 in the same. Eye 4 in the head, which is subequal to the length of the snout, and 1.09 in the interocular space. Depth of the caudal peduncle 2 in the head, and breadth before the pectoral bases 1.2 in the depth.

Head broader than deep, somewhat depressed. Operculum covered with small scales, cheeks naked. Eyes rather small, superolateral, and separated by a broad slightly concave interspace. Snout obtuse, the jaws subequal. The anterior nostril in a low tube near the upper lip, the posterior close to the orbital margin. Mouth slightly oblique, maxillary reaching backward to beyond the middle of the eye. Premaxillary teeth in a narrow band, the outer row somewhat enlarged and conical; mandibular teeth in a broader band, the posterior row somewhat enlarged. Tongue largely free, subtruncate anteriorly. Gill-opening lateral, somewhat broader than the isthmus; the exposed edge of the shoulder-girdle smooth.

¹⁰ There is some doubt as to whether a new specific name is necessary for this species or not. In substituting the name *devisi* for *stigmaticus* we have been guided by an opinion published by the Malacological Society, which deals with a precisely similar case.—*Proc. Malacol. Soc.*, vi., 8, 1904, p. 130.

¹¹ The scales are smaller and more irregular in one specimen than in the other.

Body robust, compressed posteriorly. It is covered with ctenoid scales of medium size, which become cycloid on the abdomen and neck, and are larger posteriorly than anteriorly; they extend forward to a short distance behind the eye on the upper surface of the head, and cover the breast and bases of the pectorals. Genital papilla well developed.

First dorsal originating above the middle of the pectoral; the spines increase slightly in length to the fourth, which is shorter than the post-orbital portion of the head, and the membrane from the last is widely separated from the second dorsal. The rays appear to be subequal, and a little higher than the longest spine. Anal opposite to the dorsal, and of similar form, its rays increasing in length backwards. Pectorals rounded, the median rays reaching to below the last dorsal spine; no free upper rays. Ventrals inserted a little before the pectorals, and somewhat shorter than those fins. Caudal broadly rounded.

Colour-marking.—Yellowish brown in alcohol, the scales of the upper portions with darker borders; a series of dark brown blotches along the middle of the sides on the posterior half, and an alternating series between these and the back. Head with four curved dark stripes radiating from the eye; one descends towards the angle of the mouth, two others cross the cheek, and are united by a curved bar with another which crosses the nape. First dorsal dusky, with a broad white border, and the posterior portion black. Second dorsal with dark specks on the membrane between the rays, which form a row of darker spots along the middle of the fin; a broad white border. Anal lighter, the margin clear. Caudal, pectoral, and ventral fins with microscopic dark dots between the rays.

Described from a specimen 45 mm. long, which is one of two cotypes preserved in the Australian Museum, and which were procured from Mr. De Vis. They differ from the original description in the numbers of fin-rays and scales, but agree so well with the colour description and other characters, that there can be no doubt as to their authenticity.

This species is closely allied to the genotype, *M. abei*, Jordan and Snyder¹².

Loc.—Moreton Bay, Queensland.

MUGILOGOBIUS GALWAYI, McCulloch & Waite.

Mugilogobius galwayi, McCulloch & Waite, Rec. S.Austr. Mus., i. 1, 1918, p. 50, pl. iii., fig. 1.

Hab.—South Australia.

(*Gobius*) *FLAVESCENS*, De Vis.

(Plate xxxvi., fig. 3.)

Gobius flavescens, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 689.

D. vi/8; A. 8; P. 16; V. i/5; C. 15. 27 scales between the axil and the hypural joint, and 8 between the anterior dorsal and anal rays.

Depth of the body before the ventrals 5.3 in the length to the hypural joint; head 3.7 in the same. Eye much longer than the snout, and 3.1 in

¹² Jordan & Snyder—Proc. U.S. Nat. Mus., xxiv., 1901, p. 55, fig. 5.

the head. Interocular width 1.2 in the eye. Interorbital width 2.2 in the eye, and 1.5 in the snout, which is 4.6 in the head. Depth of the caudal peduncle 1.7 in the head. Breadth before the pectoral fin 1.1 in the depth.

Head as broad as deep, with a very obtuse snout. The cheeks are naked, but the opercles are covered with about eight large concentrically striated scales. Some microscopic papillæ near the mouth and below the lower border of the preoperculum. Eye large, in the anterior half of the head, and superolateral; the interorbital space is narrow, but the distance between the ocular margins is wider. Snout tumid, its profile oblique; jaws subequal. Nostrils separate, in minute tubes, the anterior near the upper lip, the posterior near the eye. Maxilla reaching to below the anterior portion of the eye. An outer row of flattened movable teeth in each jaw, and there are some microscopic inner teeth on the anterior portion of the mandible; inner premaxillary teeth not apparent: a slightly enlarged tooth on each side of the mandibular symphysis. Tongue thick, and largely adnate to the floor of the mouth, its anterior margin subtruncate. Gill-openings lateral; the exposed edge of the shoulder-girdle smooth.

Body compressed, with a broad and rather long peduncle. Scales large and angular, and ctenoid on the body, but cycloid on the nape and neck. They extend forward to between the posterior portions of the eyes; there are seven predorsal scales, which increase in size forwards. Base of the pectoral and breast scaly. Genital papilla developed.

First dorsal originating above the anterior half of the pectoral; the second spine is slightly longer than those on either side of it, and the others decrease regularly backwards. Third dorsal ray highest, and longer than the second spine; the following rays decrease in length backwards. Anal opposite the dorsal, but with a rather shorter base; its rays are subequal in length. Pectoral rounded, the middle rays reaching the tenth row of scales. Ventrals inserted before the pectorals, and but little shorter than those fins; the basal membrane is broad. Caudal rounded.

Colour-marking.—Faded after long preservation in alcohol, but light in colour. Each scale of the upper portions with a broad submarginal border of dark dots. Head and middle of the sides freckled with clusters of dark dots, which are also present on the dorsal fins.

Described and figured from one of two cotypes 32 mm. long, which are preserved in the Australian Museum. These were secured from Mr. De Vis in 1886 by one of us (Ogilby), and are labelled as *Gobius fluvescens*, from Moreton Bay. They differ from the original description in several important details: there are nine rays in the second dorsal and anal fins instead of eleven and ten as described; the proportions of the head and depth of the body are very different from those given by De Vis; the interorbital space is much narrower than the orbit, though it should be noted that the eye is subequal to the interocular width. On the other hand they agree with the description in their colour-marking, physiognomy, and in having large scales on the nape, while the tail and other parts are covered with thick mucous. Taking into consideration the history of the specimens, and making allowance for the extraordinary inaccuracies common to De Vis' descriptions, we regard them as true cotypes of *G. fluvescens*.

Loc.—Moreton Bay, Queensland.

(Gobius) AUSTRALIS, Ogilby.

(Fig. 5.)

Gillichthys australis, Ogilby, Proc Linn. Soc. N.S.Wales (2), ix., 1894, p. 367.

(Gobius) australis, McCulloch, Rec Austr. Mus., xi. 7, 1917, p. 187, pl. xxxi., fig. 3.

Variation.—Only the largest examples of this species have the maxilla produced backward towards the preoperculum as described by Ogilby and figured by McCulloch. A fine series of over one hundred specimens, 18-41 mm. long, which were taken together in Port Jackson, shows that the mouth is always small in young specimens, reaching only a little beyond the vertical of the anterior border of the eye; this last decreases in size considerably with growth, and in the largest specimens of the series, the maxilla extends to below its posterior third. In a 45 mm. specimen, the end of the maxilla is a little behind the vertical of the posterior orbital border, and in one of 58 mm., it is midway between the eye and the preopercular margin.

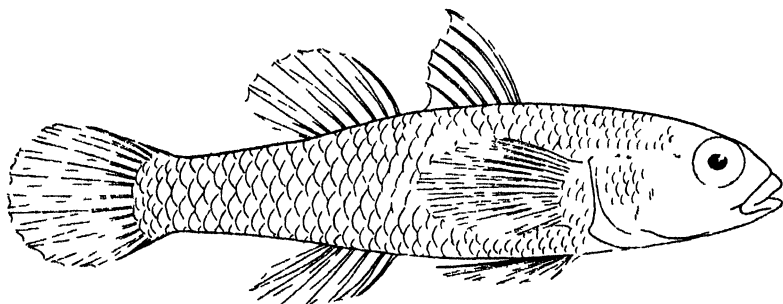


Fig 5 (*Gobius) australis*. A young specimen 29 mm. long from Port Jackson

The body is more slender in the young, but the characteristic colour-marking is well developed in even the smallest specimens of our series.

Locs.—Many specimens, including the holotype, are in the Australian Museum from several localities between Newcastle and Jervis Bay, New South Wales.

(Gobius) MICROPHthalmus, Günther.

Gobius macrostoma, Günther, Brit. Mus. Cat. Fish., iii, 1861, p. 44 (not of Steindachner).

Gobius microphthalmus, Günther, *Ibid.*, p. 550.—Substitute name.

This species appears to be closely allied to the preceding.

• *Hab.*—Australia (Günther)

Genus *AWAOUS*, *Steindachner*.

Awaous (Steindachner), Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 405.

AWAOUS CRASSILABRIS, *Günther*.

Gobius crassilabris, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 63. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 61, and Fische Südsee, vi., 1877, p. 178, pl. cviii., fig. b.

This species has been recorded from Australia by Günther. An example is in the Australian Museum from Townsville, Queensland.

Genus *GOBIUS*, *Linnaeus*.

GOBIUS ORNATUS, *Ruppell*.

(Plate xxxiii., fig. 2.)

- Gobius ornatus*, Ruppell, Atlas Reise Nordl. Afrika, Fische, 1828, p. 135. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 21, and Ann. Mag. Nat. Hist. (3), xx., 1867, p. 61. *Id.*, Kner, Reise "Novara," Zool., i., 1865, p. 173. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 312. *Id.*, Day, Fish. India, 1876, p. 294, pl. lxiii., fig. 1. *Id.*, Günther, Fische Südsee, vi., 1877, p. 172, pl. cxi., fig. a. *Id.*, Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales, i., 1877, p. 331. *Id.*, Günther, Voy. "Challenger," Zool., i. 6, 1880, p. 44. *Id.*, Macleay, Proc. Linn. Soc. N.S. Wales, ii., 1878, p. 356, and v., 1881, p. 594. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 382. *Id.*, Regan, Ann. Mag. Nat. Hist. (7), xviii., 1906, p. 453.
- Gobius ventralis* (Ehrenberg), Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 113.
- Gobius interstinctus*, Richardson., Ichth. "Erebus & Terror," 1844, p. 3, pl. v., figs. 3-6.
- Gobius periophthalmoides*, Bleeker, Nat. Tijd. Ned. Ind., i., 1851, p. 249.

D. 6/11; A. 10; P. 19; V. 1/5; C. 13. Scales in 29 rows between the operculum and the hypural joint, and in 9 between the anterior dorsal and anal rays. Depth 5 in the length to the hypural joint; head 3.6 in the same. Eye 4 in the head; interorbital width 4.5 in the eye. Snout longer than the eye, 3.2 in the head; depth of caudal peduncle 2.1 in the same.

Cheeks and opercles naked, with minute mucigerous canals and the usual preopercular, nuchal, occipital and rostral pores. Eyes of moderate size, breaking the profile, and separated by a very narrow interorbital space. Snout a little longer than the eye, its profile oblique and convex. Anterior nostril in a short tube, the posterior a simple opening. Maxillary reaching to below the middle of the eye, mandible shorter than the premaxillaries. A band of villiform teeth in each jaw; a few enlarged, cardiform, curved teeth in the front of the upper jaw, and some smaller ones in the lower; palate and tongue toothless. Tongue rounded anteriorly.

Body subcylindrical anteriorly, compressed posteriorly. It is covered with large, finely ctenoid scales, which extend forward to behind the eyes, and onto the thorax and the base of the pectoral. Most of the scales of the median lateral row each bear a vertical series of mucigerous pores. Genital papilla well developed.

First dorsal rounded, originating well behind the pectorals; the second ray is longest, about as long as the head without the operculum. The rays of the second dorsal increase slightly in length backward to the penultimate. Anal originating behind the second dorsal and terminating a little in advance of it; the two fins are of similar form, but the posterior anal rays are a little longer than those of the dorsal, and slightly longer than the second dorsal spine. Pectoral rounded, reaching to below the first dorsal ray; the four upper rays are silk-like, bifurcate, and free from the membrane. Ventrals inserted behind the pectorals but before the dorsal, and reaching to the anal. Caudal rounded.

Colour.—Light brown in alcohol, with rows of large black spots on the sides; on the nape and back, these spots are smaller and linear, and form about five rows anteriorly; a series of large blotches along the middle of the sides, and another of smaller blotches below it. Obscure darker saddles cross the back, and pearly spots are present on most of the scales. Cheeks and opercles with dark blotches, and two more cross the pectoral base. Dorsal fins with rows of dark brown spots and intermediate light pearly lines, their margins yellowish. Caudal dark spotted, with pearly lines and spots between the rays; pectoral similar, but with the dark spots less evident. Anal with about four rows of dark lines basally between the rays; these are followed by large transparent spots, after which the fin is again dark with a lighter margin. Ventrals blackish.

Described and figured from a specimen 84 mm. long, collected at Murray Island, Torres Strait. A fine series of over one hundred specimens 25-95 mm. long, and mostly from the same locality, shows that this species varies but little in the general arrangement of its colour marking. Younger examples are lighter, and have fewer and larger spots than the adults, and the pectorals are usually without darker spots.

Locs.—Specimens are in the Australian Museum from the following localities:—Murray Island, Torres Strait; Two Isles, near Cape Bedford, North Queensland; Cairns Reef, off Cooktown, Queensland; Port Darwin, North Australia; New Hebrides.

Distribution.—This species ranges from the Red Sea through the East Indies, to the Eastern Pacific. It is recorded from North-western Australia southwards to the King River (Regan), Port Darwin, and North-eastern Queensland southward to Cooktown.

The affinities of the following sixteen species are unknown to us.

(GORIUS) PAUPER, *De Vis*.

Gobius pauper, *De Vis*, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 687.

Loc.—Moreton Bay, Queensland (*De Vis*).

(GOBIUS) PRINCEPS, *De Vis*.

Gobius princeps, De Vis, *Loc. cit.*, p. 685.

Loc.—Cape York, Queensland (De Vis).

(GOBIUS) WATKINSONI, *De Vis*.

Gobius watkinsoni, De Vis, *Loc. cit.*, p. 685.

Loc.—Moreton Bay, Queensland (De Vis).

(GOBIUS) TAMARENSIS, *Johnston*.

Gobius tamarensis, Johnston, Proc. Roy. Soc. Tasm., 1882 (1883), p. 120.

Said to resemble *Gobius lateralis*, Macleay.

Loc.—Tamar River, Tasmania, in fresh water (Johnston).

(GOBIUS) HAACKEI, *Steindachner*.

Gobius haackei, Steindachner, Sitzb. Akad. Wiss. Wien, lxxxviii. i., 1884, p. 1074.

Hab.—South Australia (Steindachner).

(GOBIUS) PULCHELLUS, *Castelnau*.

Gobius pulchellus, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 125.

Loc.—Western Port, Victoria (Castelnau).

(GOBIUS) FILAMENTOSUS, *Castelnau*.

Gobius filamentosus, Castelnau, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 19.

Loc.—Adelaide, South Australia (Castelnau).

(GOBIUS) MACULATUS, *Castelnau*.

Gobius maculatus, Castelnau, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 20.

Hab.—Queensland (Castelnau).

(GOBIUS) CASTELNAUI, *Macleay*.

Gobius frenatus, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 123 (not of Günther).

Gobius castelnaui, Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 598.

Loc.—Hobson's Bay, Victoria (Castelnau).

(GOBIUS) FRENATUS, *Günther*.*Gobius frenatus*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 39.*Loc.*—Australia (Günther).(GOBIUS) NIGROOCELLATUS, *Günther*.*Gobius nigroocellatus*, Günther, Journ. Mus. Godeff., i. 2, 1874, p. 101.*Loc.*—Bowen, Queensland (Günther).(GOBIUS) PLATYSTOMA, *Günther*.*Gobius platystoma*, Günther, Proc. Zool. Soc., 1871, p. 664, pl. lxiii., fig. b.*Loc.*—Port Mackay, Queensland (Günther).(GOBIUS) VOIGTII, *Bleeker*.*Gobius voigtii*, Bleeker, Nat. Tijdschr. Ned. Ind., vii., 1854, p. 83. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 72, and Ann. Mag. Nat. Hist. (3), xx., 1867, p. 61.*Loc.*—Port Essington and Cape York (Günther).(GOBIUS) SUPPOSITUS, *Sauvage*.*Gobius suppositus*, Sauvage, Bull. Soc. Philom. (7), iv., 1880, p. 41.*Loc.*—Swan River (Sauvage).GOBIUS INFAUSTUS, *Sauvage*.*Gobius infaustus*, Sauvage, Bull. Soc. Philom. (7), iv., 1880, p. 42.*Loc.*—Melbourne (Sauvage).(GOBIUS) OLORUM, *Sauvage*.*Gobius olorum*, Sauvage, Bull. Soc. Philom. (7), iv., 1880, p. 43.*Loc.*—Swan River (Sauvage).MAPO, *Smitt*.*Mapo*, Smitt, Afh. Vet. Kong. Ak. Stockholm, 1899, p. 543 (*Gobius soporator*, Cuvier & Valenciennes.).

This genus only differs from *Gobius* in having the tongue notched on the median line anteriorly instead of being truncate.

- a. Anal with nine rays..... *fuscus*.
 aa. Anal with ten rays..... *krefftii*.

MAPO FUSCUS, Rüppell.

(Plate xxxiii, fig. 3.)

Gobius fuscus, Rüppell, Atl. Reise Nordl. Afrika, Fische, 1828, p. 137.

Gobius punctillatus, Rüppell, *Loc. cit.*, 1828, p. 138.

? *Gobius soporator*, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 56. *Id.*, Jordan & Evermann, Bull. U.S. Nat. Mus., xlvii. iii., 1898, p. 2216 (*ubi* synonymy).

Gobius albopunctatus, Cuvier & Valenciennes, *Loc. cit.*, p. 57. *Id.*, Rüppell, Neue Wirbelth., Fische, 1838, p. 138. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 25, and Fische Südsee, vi., 1877, p. 172, pl. cx., fig. a. *Id.*, Day, Fish. India, 1876, p. 294, pl. lxiii., fig. 7. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 357, and *Loc. cit.*, v., 1881, p. 595.

Gobius nebulopunctatus, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 57. *Id.*, Rüppell, Neue Wirbelth., Fische., 1838, pp. 138, 139. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 26. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 382. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 31.

Gobius pandangensis, Bleeker, Nat. Tijds. Ned. Ind., i., 1849, p. 249.

Gobius breviceps, Blyth, Proc. Asiat. Soc. Bengal, 1858, p. 271.

Gobius homocyanus, Vaillant & Sauvage, Revue Mag. Zool. (3), iii., 1875, p. 280.

Gobius darnleyensis, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 331, pl. xii., fig. 1.

Gobius nigripinnis, Alleyne & Macleay, *Ibid.*, p. 332, pl. xii., fig. 2.

Gobius sandvicensis, Günther, "Challenger" Rept., Zool., i., 1880, p. 60.

Gobius marginalis, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 686.

? *Gobius poecilichthys*, Jordan & Snyder, Proc. U.S. Nat. Mus., xxiv., 1901, p. 52, fig. 4.

Mapo fuscus, Jordan & Evermann, Bull. U.S. Fish. Bureau, xxiii. i., 1905, p. 483, fig. 212. *Id.*, Weber, "Siboga" Exped., lvii., 1913, p. 466.

D. vi/10-11; A. 9; P. 18; V. i/5; C. 15. Thirty-six rows of scales between the upper base of the pectoral and the hypural joint, and thirteen to fourteen between the anterior dorsal and anal rays.

Depth 4.2 in the length to the hypural joint; head 3.3 in the same. Breadth between the bases of the pectorals 1.1 in the depth. Eye equal to the snout, 4 in the head; interocular space 2.5 in the eye. Depth of the caudal peduncle 2.2, and caudal fin 1.05 in the head. Fifth dorsal spine 2.2, posterior dorsal and anal rays 1.4 in the head.

Head naked with swollen cheeks. Very fine rows of muciferous pores cross the cheeks and opercles, and one extends from behind the preopercular margin onto the mandible; open pores are present on the snout, interorbital space, behind the eye and the preoperculum, and above the operculum. Eyes close together, cutting the profile. Snout declivous; anterior nostril tubular, the posterior a simple opening before the eye. Mouth a little oblique, with thick fleshy lips, the maxilla reaching

to below the middle of the eye; jaws equal. An outer row of enlarged stout teeth in the premaxillaries, followed by a band of smaller ones which is broadest anteriorly but narrows laterally; a broader patch on the anterior half of the mandible, the outer teeth being largest, though there are a few enlarged ones about the middle of the sides; they form a single row on the sides. Tongue broad and notched anteriorly, only the tip free. Gill openings wider than the interspace separating them; exposed edge of the shoulder-girdle smooth.

Body compressed, covered with rather large ctenoid scales, which extend forward almost to the eyes on the nape, and cover the breast; they are rudimentary on the base of the pectoral. They increase in size towards the tail, and each scale of the median row has a vertical series of mucigerous pores on the hinder half of the body. Genital papilla large.

First dorsal commencing well behind the base of the pectoral; the five anterior spines are subequal in length, and the membrane from the last almost touches the base of the first ray. Dorsal rays increasing slightly in length backwards, the last forming a pointed lobe which overlaps the base of the caudal fin. Anal similar to the second dorsal. Pectoral rounded, reaching the vertical of the anterior dorsal rays; the three upper rays are biid and filamentous, silk-like. Ventrals inserted below the pectoral base, large and completely united, not quite reaching the vent. Caudal broadly rounded.

Colour-marking.—Back light-coloured, with six broad dark saddle-shaped cross-bands which expand and become confluent on the sides. The first crosses the nape, the second is largely anterior to the dorsal fin, the third is behind the fifth spine, the fourth behind the third ray, the fifth behind the third last ray, and the sixth near the base of the tail. Below the middle of the sides they form dark blotches which are largely alternate to those of the back. Most of the scales, particularly of the lower lateral portions, bear a round light ocellus. Cheeks and base of pectoral with numerous light spots; a dark spot behind the eye. First dorsal dusky, with darker markings, and a broad whitish border. Second dorsal dusky with lighter and darker spots on the rays, and a narrow blackish margin. Caudal with dark spots on the rays on the upper half, its lower portions and the anal somewhat dusky. Ventrals blackish, pectorals dusky.

Described and figured from a specimen 86 mm. long, from Darnley Island, Torres Strait; the details of the light spots of the head and body are supplemented from those of another example. It appears to be quite similar to an Indian example identified by Dr. Day as *G. albopunctatus*.

Variation.—The light spots which, when present, form such a striking feature of this species, appear to be developed only in larger examples, and are often lost in preservation; they are rarely retained in examples preserved in formalin, but some in alcohol exhibit them very clearly. The dark saddle-like cross-bands and the lateral blotches are usually much more pronounced in young examples than in adults, and they appear as illustrated in the figure of *M. poecilichthys*, Jordan & Snyder.

Nomenclature.—*Gobius fuscus*, 1828, was a "provisional" name for a single specimen from the Red Sea, briefly characterised by Rüppell; in 1838, this holotype was identified by its author as *G. nebulopunctatus*, Cuvier & Valenciennes, 1837, and further details of its characters were published. In 1861, Günther (Cat. p. 25) again examined this specimen¹³ in the Senckenberg Museum, and identified it as *G. alhopunctatus*, Cuvier & Valenciennes, 1837. *G. alhopunctatus* and *G. nebulopunctatus* are now generally considered identical, and as *G. fuscus* has been identified with each, and having priority, it is the proper name to be used for this species.

Synonymy.—Four examples in the Macleay collection bear the original label "*G. darnleyensis*, Alleyne & Macleay, Darnley Is." They differ from the description of that species in their proportions, but agree with the figure, and the anal rays are not longer than those of the dorsal. They are doubtless the cotypes of *G. darnleyensis*, and agree in all details with an Indian example identified by Dr. Day as *G. alhopunctatus*.

Two adults and four young specimens labelled as "*Gobius nigripinnis*, Alleyne & Macleay, Palm Islands", are in very bad condition, having been partly dried and decayed. They have ten instead of eleven rays in the second dorsal, and the interorbital space is less than half the diameter of the eye instead of equal to it. They are the cotypes of the species, and notwithstanding their imperfect condition, are clearly identical with *G. darnleyensis*.

Five cotypes of *G. marginalis*, De Vis, from Cape York, agree perfectly with those of *G. darnleyensis*.

We consider *M. poecilichthys*, Jordan & Snyder, to be merely the young form of *M. fuscus*, since we have Queensland examples which agree well with the illustration of the Japanese species, and which are connected with the adult form of *G. fuscus* as we figure it, through an intermediate series.

M. aeolosoma, Ogilby¹⁴, is very similar to and possibly identical with *M. fuscus*, differing only in its somewhat different colour-marking. Waite's figure¹⁵ illustrates the characteristic pattern of numerous specimens from Lord Howe Island, having the saddle-markings somewhat less definite than in *M. fuscus*, and a row of dark blotches along the middle of the sides, below which are some dark lines. This marking is variable however, and is sometimes not distinguishable from that of *M. fuscus*.

Locs.—Murray Island, Torres Strait; coll. Hedley and McCulloch. Darnley Island, Torres Strait; cotypes of *G. darnleyensis*. Cape York, Queensland; cotypes of *G. marginalis*. Palm Islands, Queensland; cotypes of *G. nigripinnis*. Various localities between Cooktown and Port Curtis, Queensland; coll. McCulloch. Sweers Island, Gulf of Carpentaria; coll. C. Hedley. Port Darwin, Northern Territory; Macleay Museum.

¹³ Günther (Cat., p. 26) stated that the type of *G. fuscus* was lost, but records that he examined Rüppell's "typical" example of *G. nebulopunctatus* (*Ibid.*, p. 25). Since the same specimen served for both of Rüppell's identifications, it seems probable that the example seen by Günther was really the holotype of *G. fuscus* bearing the changed name of *G. nebulopunctatus*.

¹⁴ Ogilby—Mem. Austr. Mus., ii., 1889, p. 61.

¹⁵ Waite—Rec. Austr. Mus., v., 1904, p. 176, pl. xxiii., fig. 2.

Distribution.—This species ranges from the Red Sea and the Eastern Coast of Africa to Japan, Australia, and the Eastern Pacific Ocean.

If *G. soporator* be correctly identified with it, as seems probable, its range also extends to both coasts of America.

MAPO KREFFTII, Steindachner.

(Plate xxxiii., fig. 4.)

Gobius krefftii, Steindachner, Sitzb. Akad. Wiss. Wien., liii. i., 1866, p. 451.

Gobius criniger, Steindachner, *Loc. cit.*, lvi. i., 1867, p. 326 (not of Cuvier and Valenciennes).

Gobius brevifilis, Günther, "Challenger" Rept., Zool., i., 1880, p. 28. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 35. *Id.*, Waite, Mem. N.S.Wales Nat. Club, ii., 1904, p. 45 (not *G. brevifilis*, Day).

Gobius buccatus, Macleay, *Ibid.*, p. 601. *Id.*, Ogilby, *Ibid.* *Id.*, Waite, *Ibid.* (not of Cuvier and Valenciennes).

Gobius flavidus, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 602. *Id.*, Ogilby, *Ibid.* *Id.*, Waite, *Ibid.*

D. vi/11; A. 10; P. 16-17; V. i/5; C. 14. 36-37 rows of scales between the upper base of the pectoral and the hypural joint, and 13-14 between the anterior dorsal and anal rays.

Depth 4·8 in the length to the hypural joint; head 3·4 in the same. Breadth between the bases of the pectorals 1·05 in the depth. Eye slightly shorter than the snout, 4·1 in the head. Interocular space 6 in the eye. Depth of the caudal peduncle 2·3, and the caudal fin 1·1 in the head. First dorsal spine 2, third dorsal ray and penultimate anal ray nearly 2 in the head.

Colour-marking.—Body greenish white on the back and white below with six saddle markings composed of reddish brown spots and disposed as in *M. fuscus*. Eight or nine darker blotches are present along the middle of the sides. Head mottled and dotted with reddish brown spots which are largest on the cheeks and opercles. Dorsal fins with several rows of brownish pink spots, their margins yellowish. Caudal with similar spots; the rest of the fin and the pectorals, anal, and ventrals pale yellow.

Variation.—The intensity of the colour-marking varies greatly in different specimens, though it is similarly disposed in all, and the relative lengths of the dorsal and anal spines and rays vary with growth.

This species is similar in all structural details to *M. fuscus*, and greatly resembles that species in its colour-marking also, though it apparently does not develop any light ocelli on the scales. It is characterised however, by having ten instead of nine anal rays, as we find by counting a large number of specimens of both species.

Synonymy.—Soon after the description of *G. krefftii*, Steindachner, was published, its author indicated, with much doubt, the identity of his

species and *G. criniger*. This error was unfortunately accepted, and the name *G. krefftii* has been omitted from all later lists, the species being incorrectly referred to as *G. brevifilis*, which is synonymous with *G. criniger*.

The specimens identified as *G. buccatus*, Cuvier and Valenciennes, from Port Jackson by Macleay, differ from the description of that species in having fewer rays in the dorsal and anal fins and in having a very narrow instead of a wide interorbital space. They do not differ from our examples of *M. krefftii*.

The two cotypes of *G. flavidus*, Macleay, 31-37 mm. long, are very faded, but are quite similar in all details to our *M. krefftii*.

Locs.—This species is common near Sydney, and we have examined numerous specimens from several localities between Port Stephens and Jervis Bay, New South Wales. The example figured is from Port Jackson.

GLOSSOGOBIOUS, Gill.

Glossogobius, Gill, Ann. Lyc. Nat. Hist. N.York, 1859, p. 46 (*Gobius platycephalus*, Richardson).

Cephalogobius, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, pp. 315, 320.

Body covered with rather large ctenoid scales, about 33 in a longitudinal row; head almost naked, depressed anteriorly, with lines of mucigerous pores on the cheeks. Lower jaw projecting. Teeth in several rows, the outer enlarged, fixed and subulate, the inner depressible; palate toothless. Tongue deeply notched anteriorly. Isthmus narrow, the gill-membranes close together or completely united across it; shoulder-girdle smooth. Pseudobranchiæ present. Ventral fins united, with one spine and five rays. Dorsal with six spines and about ten rays, anal with about nine.

a. Gill membranes separated by the isthmus. About 33 scales between the upper base of the pectoral and the hypural joint; maxilla reaching to below the middle of the eye. Lower portion of tail without broad blackish bars. *giuris*.

aa. Gill membranes meeting across the isthmus. About 30 scales between the upper base of the pectoral and the hypural joint; maxilla reaching to below the hinder portion of the eye. Lower half of tail with broad blackish bars. *biocellatus*.

Gobius circumspectus, Macleay (Proc. Linn. Soc. N.S.Wales, viii., 1883, p. 267) from Milne Bay, Papua, is a species of *Glossogobius*, and is very similar to *G. giuris*. The holotype is 115 mm. long. Depth 5.1 in the length from the premaxillary symphysis to the hypural joint; head, without mandible, 3.1 in. the same. D. vi/10; A. 9. Thirty-one scales between the upper base of the pectoral and the hypural joint, and $\frac{1}{2}$ 9 $\frac{1}{2}$ between the anterior dorsal and anal rays. Second dorsal spine filamentous; dorsal rays increasing in length backward, the last reaching about three-quarters of its distance from the caudal. The colour-markings are similar to those of *G. giuris*.

Gobius concavifrons, Ramsay and Ogilby (Proc. Linn. Soc. N.S.Wales (2), i., 1887, p. 12) is also a *Glossogobius*, and possibly identical with *G. celebius*, Cuvier and Valenciennes.

GLOSSOGOBIOUS GIURIS, *Buchanan*.

- Gobius giuris*, Buchanan, Fish. Ganges, 1822, pp. 51, 366, pl. xxxiii, fig. 15. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 21. *Id.*, Day, Fish. India, 1876, p. 294, pl. lxvii, fig. 1 (*vide* synonymy). *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 356.
- Gobius fasciato-punctatus*, Richardson, Voy. "Sulphur," Ichth., 1845, p. 145, pl. lxii, figs. 13, 14.
- Glossogobius giuris*, Weber, "Siboga" Exped., lvii., 1913, p. 468, fig. 93.
- Gobius suuroides*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 48.
- Eleotris laticeps*, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 692.

D. vi/10; A. 9; P. 21; V. i/5; C. 13. 34 rows of scales between the upper base of the pectoral and the hypural joint, and 11 between the anterior dorsal and anal rays.

Depth 5·8 in the length between the premaxillary symphysis and the hypural joint; head, without the mandible, about 3 in the same. Eye 6 in the head, and 1·8 in the snout, which is 3·3 in the head. Interorbital space 1·8 in the eye. Depth of the caudal peduncle 3·3 in the head; breadth between the pectoral bases subequal to the depth. Second dorsal spine 2 2, first dorsal ray about 2, third anal ray 2·7, and caudal 1·3 in the head.

Head naked, with the exception of a few small scales on the upper portion of the operculum. About five rows of minute pores cross the cheek horizontally, and others extend around the eye and preopercular margin, and on the operculum, snout and mandible; an open pore between the eyes, and others behind the preopercular margin. Eyes of moderate size, superolateral, and separated by a flat interorbital space. Snout long, obtusely pointed, the mandible much longer than the upper jaw; maxillary reaching to below the middle of the eye. Nostrils close together, the anterior in a short tube, the posterior a simple opening slightly nearer the eye than the end of the snout. Premaxillary teeth in two series, the outer formed of a row of fixed subulate teeth, and the inner of a band of depressible teeth, the innermost of which are much longer than the others and acicular; mandibular teeth similar. Tongue largely free, its anterior margin deeply notched. Free edges of the gill-membranes separated by a space about half as wide as the eye; exposed margin of the shoulder-girdle smooth, without papillæ.

Body subcylindrical anteriorly, compressed posteriorly, and covered with rather large, angular, ctenoid scales, which are largest posteriorly. They extend forward to a little behind the eyes on the nape, and onto the breast and base of the pectoral. A small genital papilla.

First dorsal commencing a little before the middle of the pectorals; the second spine is longest, the others decreasing backwards; dorsal rays decreasing in length backwards, the last reaching about half its distance from the caudal. Anal nearly opposite the soft dorsal, the rays increasing in height backwards. Pectoral narrowly rounded, the median rays almost reaching the vertical of the vent. Ventrals completely united, inserted behind the pectorals, and reaching about three-quarters of their distance from the vent. Caudal rounded.

Colour-marking.—Whitish in formaline, mottled with olive-green script-like markings on the head and upper half of the body; four larger dark blotches along the sides, and a blackish spot at the base of the tail. Operculum with a dark blotch. Dorsal and caudal fins with rows of greyish spots on the rays; base of the pectoral with a dark bar on its upper portion.

Described from a specimen 127 mm. long, from the Flinders River, Queensland, which is quite similar to an Indian example received from Dr. Francis Day.

Synonymy.—*Gobius sauroides*, Castelnau, was described from a specimen seven inches long, which was taken in the Norman River, Gulf of Carpentaria. We have an example rather less than five inches long from the same locality, which agrees with Castelnau's description in most details, though it has fewer scales and more numerous dorsal rays. It is identical with *G. giuris*, and indicates that *G. sauroides* is synonymous with that species.

The holotype of *Eleotris laticeps*, De Vis, is preserved in the Queensland Museum. It has been stuffed and is now very imperfect, the fins being much broken, while no trace of its colour-marking remains. It is clearly identical with *G. giuris*, however, even a portion of the membrane uniting the ventrals being preserved between the bases of the fins.

Locs.—Flinders River, near Richmond, Queensland; coll. F. L. Berney. Norman River, Gulf of Carpentaria; coll. Dr. C. Taylor. Port Darwin, Northern Australia; Macleay Museum.

GLOSSOGOBIOUS BIOCELLATUS, Cuvier and Valenciennes.

Gobius biocellatus, Cuvier and Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 73. *Id.*, Gunther, Brit. Mus. Cat. Fish., iii., 1861, p. 20. *Id.*, Day, Fish. India, 1876, p. 289, pl. lxiii, fig. 8.

(*Gobius* (*Glossogobius*) *biocellatus*, Weber, "Siboga" Exped., lvii., 1913, p. 470. *Glossogobius vaisigani*, Jordan and Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 403, fig. 93.

D. vi/10; A. 9; P. 17; V. i/5; C. 13. 29 rows of scales between the upper base of the pectoral and the hypural joint; 9 between the anterior dorsal and anal rays.

Depth 6.5 in the length between the premaxillary symphysis and the hypural joint; head, without mandible, 3.1 in the same. Eye 4.6 in the head, and 1.2 in the snout, which is 4 in the head. Interorbital space 4.2 in the eye. Depth of caudal peduncle 3.5 in the head; breadth between the bases of the pectorals slightly greater than the depth. Second dorsal spine 2.1, second dorsal ray 1.7, penultimate anal ray 1.6, and caudal 1.3 in the head.

Head wholly naked, mucigerous system not well defined. Eyes superior, separated by a very narrow interspace. Snout long, pointed, the mandible much longer than the upper jaw. Maxilla almost reaching the vertical of the hinder orbital margin. Anterior nostril in a short tube, the posterior a large opening, much nearer the eye than the end of the snout. An outer row of curved, subulate teeth in the premaxillary,

decreasing in size backwards; an inner row of large, acicular, depressible teeth, and an intermediate series of minute teeth between them. Mandibular teeth similar to those of the upper jaw anteriorly, but the fixed teeth are smaller laterally, and the minute ones are lost on the sides. Tongue largely free, deeply notched anteriorly. Gill-membranes united across the isthmus; free-edge of shoulder-girdle smooth, without papillæ.

Body subcylindrical anteriorly, compressed posteriorly, and covered with large, angular, ctenoid scales, which are largest posteriorly. They extend forward to a little behind the eyes above, and onto the breast and the base of the pectorals. Genital papilla very small.

First dorsal commencing a little behind the base of the pectoral; second spine longest, and the margin of the fin rounded. Dorsal rays subequal in height, the last reaching backward to about three quarters of its distance from the hypural joint. Anal opposite the soft dorsal, its rays increasing in height backwards. Pectoral reaching the vertical of the vent. Ventrals completely united, and reaching the vent; they are inserted beneath the base of the pectoral. Caudal somewhat pointed, the lower rays obliquely truncate.

Colour-marking.—Brown in alcohol, the scales of the lower half of the sides lighter, with broad brown margins; about six dark blotches along the sides, and three or four narrow, dark horizontal lines along the series of scales. Head dark speckled, with a light marking from the eye to the mouth. First dorsal dark, with some broad lighter markings basally; a dark blotch between the first and second spines, and a black, light-edged ocellus between the fifth and sixth spines. Second dorsal dark, with microscopic, blackish dots, which form darker spots in irregular rows. Anal blackish, the rays lighter, and some white spots posteriorly. Caudal grey above, with indefinite darker bars; the lower portion bears three or four broad dark cross-bars, which are darkest basally, and separated by light interspaces. Pectoral with a dark horizontal bar on the lower portion of its base. Ventrals with dark transverse bars.

Described from a specimen 85 mm. long. A second taken with it does not offer any noticeable differences.

Synonymy.—These examples agree so well with the description and figure of *G. vaisigani*, Jordan and Seale, that they are evidently identical with that species. We have also compared them with an Indian example of *G. biocellatus*, received from Dr. Francis Day, which, though in rather bad condition, is evidently similar in all details. We therefore regard *G. vaisigani* as synonymous with *G. biocellatus*.

Loc.—Finches' Creek, Cooktown, North Queensland; coll. A. R. McCulloch.

PARAGOBIODON, Bleeker.

Ruppelia and *Rupellia*, Swainson, Nat. Hist. Class. Amph. Rept. Fish., ii., 1839, pp. 184, 281 (*Gobius echinocephalus*, Rüppell). Not *Ruppellia*, Wiedemann, 1830, a genus of Diptera.

Ruppellia (Swainson) Jordan & Richardson, Check-list Fish. Philippine Arch., 1910, p. 47.

Paragobiodon, Bleeker, Ned. Tijdschr. Dierk., iv., 1873, p. 129 (*Gobius echinocephalus*, Rüppell)¹⁶. *Id.*, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 309. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 396.

Form short and compressed, head subglobular. Body with large ctenoid scales. Head naked, with papillæ or setæ; some large open pores on the upper surface of the head, behind the eye and preopercular margin. Snout rounded, jaws subequal, mouth very oblique; nostrils in short tubes; no barbles. A band of villiform teeth in each jaw, and an outer row of enlarged teeth; mandible with a curved canine on each side of the symphysis; palate toothless. Tongue rounded, free anteriorly. Gill-openings lateral, isthmus very broad. Exposed edge of shoulder-girdle a smooth ridge. Pseudobranchiæ present; gill-rakers few, short and spinate. Dorsal with about vi/10 rays, short and rounded; anal similar to second dorsal, with about 10 rays. Pectorals large, without free rays. Ventrals united, cup-shaped, with i/5 rays. Caudal rounded.

PARAGOBIODON ECHINOCEPHALUS, *Ruppell*.

(Plate xxxiv., fig. 1.)

Gobius echinocephalus, Rüppell, Atlas Fische Roth. Meers, 1828, p. 136, pl. xxxiv., fig. 3, and Neue Wirbelth., Fische, 1838, p. 138. *Id.*, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 134. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 34, and Fische Südsee, vi., 1877, p. 175, pl. cviii., fig. d. *Id.*, Klunzinger, Verh. Zool. Bot. Ges. Wien, 1871, p. 475.

Gobius amiciensis, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 135. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 35. *Id.*, Sauvage, Poiss. Madagascar, 1891, p. 352, pl. xli.

Gobius xanthosoma, Bleeker, Nat. Tijdschr. Ned. Indie, iii., 1852, p. 703. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 42.

Gobius melanosoma, Bleeker, Nat. Tijdschr. Ned. Indie, iii., 1852, p. 703. *Id.*, Peters, Monatsbr. Ak. Berlin, 1868, p. 265. *Id.*, Day, Fish. India, 1876, p. 297, pl. lxiv., fig. 1.

Gobius gobiodon, Day, Proc. Zool. Soc., 1869, p. 516.

Gobius gibbosus, Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 601.

Gobius scabriceps, Macleay, *Loc. cit.*, p. 603.

Gobius waitii, Garman, Bull. Mus. Comp. Zool., xxxix., 1903, p. 234, pl. iii., fig. 3.

Paragobiodon echinocephalus, Bleeker, Nederl. Tijdschr. Dierk., iv., 1873, p. 129, and Verh. Akad. Amsterdam, xviii., 1879, p. 17. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 397.

Paragobiodon xanthosomus, Bleeker, Arch. Néerl. Sci. Nat., xiii., 1878, p. 54. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 397.

¹⁶ Fide Weber & de Beaufort—Fish. Indo-Austr. Arch., i., 1911, p. 289.

Paragobiodon melanosoma, Bleeker, Resch. Faun. Madagascar, 1875, p. 78, and Arch. Néerl. Sci. Nat., xiii., 1878, p. 54.

Ruppellia echinocephala, Jordan & Richardson, Check-list Fish. Philippine Islands, 1910, p. 47. *Id.*, Ogilby, Mem. Qld. Mus., ii., 1913, p. 92.

Ruppellia melanosoma, Jordan & Richardson, *Loc. cit.*

D. vi/10; A. 10; P. 20; V. i/5; C. 17. 24 scales between the axil and the hypural joint, and 10 between the anterior dorsal and anal rays.

Depth 3 in the length to the hypural joint; head 3.2 in the same. Eye 3.7 in the head, a trifle longer than the snout, and 1.6 in the interocular space. Breadth before the bases of the pectorals 1.4 in the depth; depth of the caudal peduncle 1.7 in the head.

Head a little deeper than long, naked, with bristle-like filaments; these are longest and most numerous on the lower surfaces, while they also cover the operculum and occiput, and leave the upper portion of the cheek and side of the neck bare. Some large open pores are present on the preopercular border, behind the eye, and on the interorbital area. Eyes in the anterior half of the head, separated by a wide convex interorbital space. Snout very obtuse, the anterior profile subvertical, the upper arched evenly backward to the dorsal spines; chin prominent. Mouth subvertical, the maxilla reaching to below the anterior border of the eye. Nostrils large, the anterior in a tube near the lip, the posterior almost above the margin of the eye and with a raised margin. A band of villiform teeth in each jaw, the outer ones enlarged anteriorly; a strong inner canine on each side of the mandibular symphysis, followed by two or three smaller ones towards the sides. Tongue thick, rounded anteriorly and free. Gill-openings opposite and about as wide as the bases of the pectorals, narrower than the isthmus separating them; shoulder-girdle smooth.

Body short and thick, with large ctenoid scales which commence abruptly on an oblique line extending from the axil to the anterior dorsal ray; abdomen largely scaly, the base of the pectoral and the breast naked, the latter with filaments similar to those of the head. Median row of body scales with vertical series of minute mucigerous papillæ. Genital papilla large.

First dorsal fin rounded and connected with the base of the second by membrane; the fourth spine is longest, and about once and two-thirds as long as the eye. Second dorsal somewhat rounded and higher than the first, the median rays longest, the posterior not reaching the base of the caudal. Anal opposite the soft dorsal, the rays increasing in height to the eighth. Pectoral large and rounded, reaching to above the third anal ray. Ventrals rounded and cup-shaped, their lower surfaces densely papillose; the spines are broad with a furrow on their anterior faces, and bent backward at their tips; they support a strong basal membrane. Caudal rounded.

Colour.—Uniformly bleached after long preservation in alcohol. Uniform reddish-brown, according to Macleay.

Described from one of the three cotypes of *Gobius scabriceps*, Macleay, 30 mm. long; this differs from its brief description in having the diameter of the eye two thirds as wide as the interocular space instead of less than one half. The accompanying figure represents a smaller specimen, 23½ mm. long, from Masthead Island, which differs principally in having the head lighter in colour than the body, and covered with only papillæ instead of filaments.

Variation.—A careful comparison of sixty-two specimens, 12-34 mm. long, indicates that this species is highly variable in its colouration, but that such variations do not represent even subspecific characters. (A) Five examples from Masthead Island have the body and fins brownish-black with the head flesh-coloured. (B) Four others from Green Island are more nearly uniform brown, the body being lighter and the head not so pale. (C) Of five small specimens from Murray Island, one is like A; the others have all the fins except the ventrals blackish, while the head and body is flesh-coloured; four others from Masthead Island are similarly coloured. (D) Four specimens from German New Guinea are each differently coloured, and are somewhat intermediate between forms C and E. (E) Thirty-six from Masthead Island and three from Murray Island are light coloured all over, grass-green in life, with the margin of the caudal dark and usually of the dorsal and anal also.

The filaments on the head are more papillose in the small dark coloured examples than in the lighter ones of similar size, in which they are setiform, and they are less abundant on the nape; this feature is variable however, and offers no specific character. In younger specimens also, the scales near the dorsal and anal fins are imperfectly developed, so that they appear less numerous in a transverse series than in adults.

Synonymy.—The variability of this species has caused writers to bestow several names upon it. *Gobius amiciensis*, Cuvier and Valenciennes, was reduced to the synonymy of *G. echinocephalus* by Klunzinger, who has been followed by later authors. *G. xanthosoma*, Bleeker, and *G. melanosoma*, Bleeker, are also identical with *G. echinocephalus* according to Weber. *G. gobiodon*, Day, was relegated to the synonymy of *G. melanosoma* by its author, while *G. waitii*, Garman, is evidently another synonym, as suggested by Jordan and Seale under *G. xanthosoma*. Finally, we have compared the types of *G. gibbosus*, Macleay, and *G. scabriceps*, Macleay from the Endeavour River, and find them identical in all details, and evidently synonymous with *G. echinocephalus*.

Localities of specimens examined.—Masthead Island off Port Curtis, and Green Island off Cairns, Queensland; coll. McCulloch. Endeavour River, Queensland; types of *G. gibbosus* and *G. scabriceps*. Murray Island, Torres Strait; coll. Hedley and McCulloch. German New Guinea, Duke of York Island, and Bougainville Island.

Genus ZONOGOBIOUS, Bleeker.

Zonogobius (Bleeker), Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 397.

ZONOGOBIOUS NUCHIFASCIATUS, Günther.

Gobius nuchifasciatus, Günther, Journ. Mus. Godeff., i. 4, 1874, p. 266.

Zonogobius semidoliatus, McCulloch, Proc. Linn. Soc. N.S.Wales, xxxvi., 1912, p. 606 (Not of Cuvier & Valenciennes).

The Queensland specimens recorded by McCulloch as *Z. semidoliatus* differ from that species in having a distinct membrane uniting the ventral spines, while the cephalic colour-bars are less distinct. They are apparently referable to *G. nuchifasciatus*.

Loc.—Dunk Island, Queensland, and Masthead Island, off Port Curtis, Queensland. Günther's specimens were collected at Bowen, Queensland.

(GOBIUS) LIDWILLI, McCulloch.

(*Gobius*) *lidwilli*, McCulloch, Rec. Austr. Mus., xi. 7, 1917, p. 185, pl. xxxi., fig. 2.

Loc.—Near Sydney.

[GOBIUS] BIFRENATUS, Kner.

Gobius bifrenatus, Kner, Reise "Novara," Zool., i., 1865, p. 177, pl. vii., fig. 3. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 383. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 597. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 35. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 28. *Id.*, Waite, Mem. N.S.Wales Nat. Club, ii., 1904, p. 46.

Gobius bassensis, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 123.

Gobius caudatus, Castelnau, *Ibid.*, ii., 1873, p. 47. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 600. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 29.

D. vi/11; A. 11; P. 17; V. i/5; C. 15. Scales in about 37 rows between the base of the pectoral and the hypural joint, and about 12 between the anterior dorsal and anal rays.

Depth 5.1 in the length to the hypural joint; head 4 in the same. Eye 4.6 in the head; interocular space 2.8 in the eye. Snout 3.8, depth of caudal peduncle 2.1 in the head.

Head naked, swollen, with the usual preopercular, nuchal, occipital and rostral pores; rows of minute pores on the cheeks and opercles, mandible, snout, occiput and shoulders. Eyes of moderate size, cutting the dorsal profile, and separated by a narrow bony ridge. Snout convex, a little longer than the eye. Mouth oblique, maxillary reaching to below the middle of the eye; mandible not projecting beyond the upper jaw. An outer row of enlarged teeth in each jaw, some of which are caniniform; these are followed by a band of villiform teeth, and an inner series of slightly larger teeth: palate and tongue toothless. Tongue rounded anteriorly, slightly notched on the median line. Gill-opening very wide, the isthmus scarcely wider than the eye; shoulder-girdle smooth.

Body compressed, the breadth between the pectorals 1.4 in its depth. It is covered with ctenoid scales which are large and regular posteriorly, but small and irregular anteriorly. They extend forward to above the operculum, leaving the nape and pectoral base naked; thorax scaly. There are approximately thirty-seven rows between the upper base of the pectoral and the hypural joint, but the anterior scales are so irregular that either more or less may be counted. Genital papilla well developed.

First dorsal rounded, the fourth and fifth rays longest, as long as the postorbital portion of the head; second dorsal rays increasing in height backwards, the last as long as the head without the operculum, and reaching to the base of the caudal rays. Anal of similar form to the second dorsal, commencing behind its second ray, and terminating slightly behind its last; the last ray is as long as that of the second dorsal. Pectoral somewhat pointed, its eleventh ray longest, reaching to a little behind the vertical of the vent. Ventrals completely united, not quite reaching the vent. Caudal elongate, pointed, the median rays longer than the head and trunk.

General colour light green in life, abdomen white. Muzzle and throat greenish-black; a broad purplish-black bar from below the eye extends obliquely across the opercles to the lower base of the pectoral, and terminates between the pectoral and ventral bases; another bar is situated in the nuchal groove, and extends backward on the body to below the last dorsal spine; an interrupted, curved bar commences behind the eye, and crosses the cheek to behind the mouth; upper lip blackish. An incomplete dark bar commences beneath the pectoral, and running downward, breaks up into a row of blackish blotches above the anal fin. Many of the scales near the back on the hinder part of the body bear oblique, purplish streaks near their margins. Large opalescent spots are arranged in two irregular rows on the anterior half of the body, the base of the pectoral, thorax, and the preoperculum. Dorsal fins with a broad, horizontal, dark bar near their bases, the remainder of the fins almost hyaline; anterior spines tipped with orange. Caudal dark green, with a pale yellowish border, and a lighter median area; about five broad purple bars cross the basal half obliquely, and become broken up into broad interradiial spots distally. Anal pale orange basally, with a broad greyish border. Ventrals similar to the anal, pectoral greenish-grey.

Described from a fresh specimen 142 mm. long, secured by Mr. J. H. Wright at Sans Souci, Botany Bay. It was caught in a prawn-net, among sea-grass (*Zosteru*), where the species is not uncommon. A fine series of seventy specimens, ranging from 28 mm. in length, shows that the characteristic markings of this species are developed early in life, and vary but little. The posterior dorsal and anal rays, and the median caudal rays are proportionately shorter in the younger examples, but in all other details they are very similar to the adults.

Synonymy.—Klunzinger suggested the identity of *G. bassensis*, Castelnau, and *G. bifrenatus*, but counted about 50 scales in the latter species, whereas according to Castelnau, there are only 38 on the lateral line. I find them very irregular anteriorly and variable in number, but

they appear to be usually nearer forty than fifty. We have examined a photograph of the type of *G. caudatus*, Castelnau, which is preserved in the Paris Museum, and are convinced that species also is synonymous with *G. bifrenatus*.

Locs.—Botany Bay and Port Jackson. Richmond River estuary, northern New South Wales. Eden, south coast of New South Wales. Near the Yarra River mouth, Hobson Bay, Victoria. Goolwa, Noarlunga, and near Adelaide, South Australia.

Hab.—This species has so far been recognised only from New South Wales and Victorian waters. Many specimens lent for examination by the South Australian Museum, prove the species to be common in the estuarine waters near Adelaide also.

[GOBIUS] SEMIFRENATUS, *Macleay*.

(Plate xxxiv., fig. 2.)

Gobius semifrenatus, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 598. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 35. *Id.*, Waite, Mem. N.S.Wales Nat. Club, ii., 1904, p. 46.

D. vi/11; A. 12; P. 17; V. i/5; C. 17. About 32 scales from above the base of the pectoral to the hypural joint, and about 11 between the anterior dorsal and anal rays.

Depth almost 5 in the length to the hypural joint; head 3·6 in the same. Eye 4·6 in the head, shorter than the snout. Interocular space 3 in the eye. Snout 3·8, depth of the caudal peduncle 2·3 in the head.

Form and structural details almost exactly similar to those of *G. bifrenatus*, but with the scales rather more regular and somewhat larger anteriorly. The posterior dorsal and anal rays are a little shorter, and the caudal is less produced, the median rays being only 0·2 longer than the head.

Colour green, white below. Snout and upper surface of the head with numerous small dark spots, which become larger on the nape; a broad incomplete dark bar extends from below the eye, across the opercles to the lower base of the pectoral, and terminates between the pectoral and ventral bases; another imperfect bar is situated in the nuchal groove, and ends in a dark shoulder-spot. An incomplete dark bar commences behind the pectoral and becomes confused with a row of seven or eight dark blotches on the lower portion of the sides, which are correlated with some irregular transverse bars on the body. Many scales on the anterior parts of the sides with opalescent spots. Dorsal fins with series of grey spots forming oblique rows which run forward and upward; a broad light margin to each fin. Caudal with small dark, light-edged spots between the rays near the base; rarely these coalesce to form a broad bar at the extreme base. Anal and ventral dusky.

Described and figured from a specimen 113 mm. long.

A series of thirty-six specimens, 52-113 mm. long, including Macleay's types, indicates that *G. semifrenatus* may be distinguished from *G. bifrenatus* by certain differences in the colour-marking. *G. bifrenatus* has well defined bridle-marks, and the upper surface of the head without spots; body without cross-bars; dorsal fins longitudinally banded, and the caudal with broad bars. In *G. semifrenatus* the bridle-marks are less definite, and the head is distinctly spotted above; body with cross-bars; dorsal fins with oblique rows of grey spots, and the caudal with small interradiat spots. The two species are very similar in structure, differing only in the form of the caudal fin, and in the disposition of the anterior scales. They have been captured together in a prawn-net at Sans Souci, Botany Bay, by Mr. J. H. Wright, but as the two forms of colour-marking do not appear to be correlated with either growth or sex, we regard them as representing distinct species.

Locs.—Specimens are in the Australian Museum from Port Jackson and Botany Bay, New South Wales.

Hab.—New South Wales.

Genus RHINOGOBIUS, Gill.

Rhinogobius, Gill, Proc. Acad. Nat. Sci. Philad., 1859, p. 145 (*R. similis*, Gill).

Body robust, compressed, covered with large ctenoid scales, which become cycloid on the breast and the base of the pectoral. Head entirely naked, with lines of mucigerous pores crossing the cheeks and opercles, and large open pores above the nostrils, on the interorbital space, along the nuchal groove, and around the preopercular margin. Snout obtuse, the profile convex. Jaws subequal. Mouth a little oblique; no barbules. A band of villiform teeth in each jaw, and an outer series of enlarged ones; a subcaniniform tooth may be present on each side of the mandible. Tongue subtruncate, and free anteriorly. Gill-openings lateral, the isthmus broad. Exposed edge of the shoulder-girdle smooth. Pseudo-branchiæ present. Gill-rakers short and thick, about five on the lower limb of the first arch. Dorsal fins short, with about six spines and ten rays; anal similar to the soft dorsal. Pectorals rounded, without free rays. Ventrals large, united, with a broad basal membrane; they have one spine and five rays. Caudal rounded.

The above definition is based upon *R. nebulosus*, Forskal, and *R. leftwitchi*, Ogilby.

Key to the Australian species.

- a. Eye larger; three large dark lateral blotches, scales without dark borders.....*nebulosus*.
- aa. Eye smaller; five smaller lateral blotches, scales with dark borders.....*leftwitchi*.

RHINOGOBIUS NEBULOSUS, Forskal.

Gobius nebulosus, Forskal, Descr. Anim., 1775, p. 24. *Id.*, Bloch and Schneider, Syst. Ichth., 1801, p. 72. *Id.*, Cuvier and Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 84.

- Gobius criniger*, Cuvier & Valenciennes, *Ibid.*, p. 82. *Id.*, Richardson, Ichth. "Erebus & Terror," 1844, p. 2, pl. i., figs. 3-4. *Id.*, Cantor, Cat. Malay. Fish., 1850, p. 184. *Id.*, Bleeker, Nat. Tijds. Ned. Ind., iii., 1852, p. 453. *Id.*, Günther, Cat. Fish. Brit. Mus., iii., 1861, p. 29. *Id.*, Day, Fish. Malabar, 1865, p. 111, and Fish. India, 1876, p. 288, pl. xlii., fig. 2. *Id.*, Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales, i., 1877, p. 330. *Id.*, Macleay, Proc. Linn. Soc. N.S. Wales, ii., 1878, p. 356, and v., 1881, p. 595. *Id.*, Weber, "Siboga" Exped., lvii., 1913, p. 461.
- Gobius brevifilis*, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 90. *Id.*, Day, Proc. Zool. Soc., 1867, p. 940. *Id.*, Günther, Fische Südsee, vi., 1877, p. 176, pl. cviii., fig. g. *Id.*, Sauvage, Hist. Madag., xvi., 1891, pl. xli., fig. 2.
- Gobius caninus* var. *africanus*, Playfair, Fish. Zanzibar., 1866, p. 71, pl. ix., fig. 1.
- Gobius caninus* (var. *africanus*), Steindachner, Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 313 (not *G. caninus*, Cuv. & Val.).
- Gobius auchenotaenia*, Bleeker, Arch. Néerl. Sci. Nat., ii., 1867, p. 415, and in Pollen & van Dam, Faun. Madag., iii., 1874, p. 56, pl. xviii., fig. 1. *Id.*, Sauvage, Hist. Madag., xvi., 1891, pl. xxxix., fig. 3.
- Otenogobius criniger*, Bleeker, Arch. Néerl. Sci. Nat., xiii., 1878, p. 54.
- Gobius festivus*, De Vis, Proc. Linn. Soc. N.S. Wales, ix., 1884, p. 687.
- Coryphopterus criniger*, Seale, Occ. Pap. Bishop Mus., iv., 1906, p. 84.
- Rhinogobius nebulosus*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 401. *Id.*, Jordan & Richardson, Bull. U.S. Fish. Bureau, xxvii., 1908, p. 276, and Check List Fish. Philipp. Is., 1910, p. 47.
- Rhinogobius lungi*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxvi., 1907, p. 41, fig. 13.

D. v(vi)/10; A. 10; P. 18; V. i/5; C. 13. 31 rows of scales between the upper base of the pectoral and the hypural joint, and 13 between the anterior dorsal and anal rays.

Depth 4.3 in the length to the hypural joint, head 3.1 in the same. Orbit 3.5 in the head, longer than the snout, which is 4.1 in the head; interorbital width 3.5 in the orbit. Breadth between the pectoral bases 1.2 in the depth. Depth of the caudal peduncle 2.5 in the head. Third dorsal spine 1.3, third dorsal ray 2.1, and the penultimate anal ray 2.08 in the head; pectoral 1.5, and caudal 1.3 in the head.

Head naked; cheeks and operculum with many rows of mucigerous pores, which also extend onto the snout, nape and mandible; larger open pores are present on the upper surface of the head, along the nuchal groove and around the preopercular border. Eyes large, separated by a narrow, concave interorbital space. Snout forming a convex curve and broadly rounded anteriorly; anterior nostril in a short tube, the posterior a simple opening. Mouth oblique, jaws equal, the maxilla reaching to below the anterior fourth of the eye. A band of villiform teeth in each jaw, and an outer row of enlarged subulate ones anteriorly, which extend

onto the sides and decrease in size backwards in the premaxillaries; no true canines. Tongue subtruncate and free anteriorly. Gill-openings lateral, separated by a wide isthmus; exposed edge of the shoulder-girdle forming a curved smooth ridge.

Body rather stout, compressed. It is covered with large, strongly ctenoid scales, which are reduced and rudimentary before the dorsal fin, and leave the nape and portion of the neck bare; they are cycloid and small on the breast and bases of the pectorals. Genital papilla well developed.

First dorsal originating above the anterior portion of the pectoral; the second and third spines are filiform and free terminally, and reach well beyond the anterior ray when adpressed. Margin of the second dorsal straight, rounded posteriorly; the rays are subequal in height, and the posterior ones do not reach the caudal when adpressed. Anal similar to the soft dorsal, the rays increasing slightly in length to the penultimate. Pectoral rounded, not quite reaching the vertical of the anterior dorsal ray. Ventrals united, reaching the vent, with a broad basal membrane. Caudal rounded.

Colour-marking.—Light brown in alcohol, lighter below, with large well-defined, blackish-brown spots on the back and sides; a large spot is beneath the pectoral below the posterior dorsal spines, another below the hinder part of the soft dorsal, and one at the base of the tail; a paired series crosses the nape, another before the dorsal fin, six cross the back and sides near the hinder part of the spinous dorsal, a pair is near the middle of the soft dorsal, one behind the last ray, and a small one near the caudal base; in addition there are numerous intermediate lighter and smaller spots on the upper half of the body. A dark bar from the orbit to the mouth, and a larger one from behind the eye to behind the angle of the mouth. Operculum and base of the pectoral with several large blotches. First dorsal with a median row of blackish spots, its outer portion dusky, and the ends of the spines black. Second dorsal with three irregular rows of blackish, light-edged ocelli between the rays, and a black margin. Caudal with about five rows of similar ocelli, and a dark border. Anal with a black border.

Described from a specimen 99 mm. long, from Port Darwin, which is unusual in having only five instead of six dorsal spines.

Variation.—Thirty-two specimens 30-117 mm. long, prove the markings of this species to be very constant in disposition though variable in their intensity; the dark borders of the vertical fins may be absent, especially in young specimens, and that of the anal is replaced by a median dark band in some of our younger examples. The filaments of the dorsal spines vary in length, and may be longer in young specimens than in those of larger size, while they are occasionally scarcely developed.

Synonymy.—Four cotypes of *Gobius festivus*, De Vis, agree with their description in the more obvious characters, but prove it to be inaccurate in various details. The upper pectoral rays are not free or silky, and the scales do not extend forward to the orbit on the sides of the neck. The

maxilla reaches to below the anterior portion of the eye instead of nearly to the middle, and the first dorsal is not lower than the second. They are similar in all details to an Indian example identified by Dr. Day as *G. criniger*, which is synonymous with *R. nebulosus*.

Locs.—We have examined specimens from the following localities. Shark Bay, West Australia. Port Darwin, North Australia. Sweers Island, Gulf of Carpentaria; coll. Hedley. Cape York, North Queensland; cotypes of *G. festivus*. Thursday Island, Torres Strait; coll. Hedley & McCulloch. Darnley Island, Torres Strait; coll. Dr. J. R. Tosh. New Hebrides. Madras, India; Dr. Day's collection.

Distribution.—Red Sea, Zanzibar, and Madagascar, through the Malayan Archipelago to the Pacific; Northern Australia. Bleeker¹⁷ identified a Tasmanian fish as *G. criniger*, but this species does not occur so far south.

RHINOGOBIUS LEFTWITCHI, *Ogilby*.

(Plate xxxiv., fig. 3.)

Rhinogobius leftwitchi, *Ogilby*, Proc. Roy. Soc. Qld., xxiii., 1910, p. 24.

D. vi/10; A. 10; P. 17; V. i/5; C. 13. 30 scales between the axil and the hypural joint, and eleven between the anterior dorsal and anal rays.

Depth before the ventrals 4.4 in the length to the hypural joint; head 3.5 in the same. Eye equal to the length of the snout, 3.6 in the head; interorbital space 2.6 in the eye. Depth of the caudal peduncle 2.5 in the head. Breadth before the pectoral bases 1.4 in the depth.

Head a little deeper than broad, entirely naked. Cheeks and operculum with many rows of mucigerous pores, arranged as shown in the figure; large open pores are present on the interorbital space, along the nuchal groove, and around the preopercular border. Eyes smaller than in *R. nebulosus*, separated by a narrow interorbital space. Snout obtuse, and broadly rounded; anterior nostril in a short tube near the upper lip, the posterior a simple opening near the eye. Mouth oblique, the maxilla reaching to below the anterior border of the eye; the mandible slightly longer than the upper jaw. A band of villiform teeth in each jaw, and an outer row of enlarged ones in the premaxillaries, which increase in size backwards; a small canine on each side of the mandible, between which is an outer enlarged row of teeth. Tongue subtruncate, and free anteriorly. Gill-openings lateral, separated by a broad isthmus; exposed edge of the shoulder-girdle smooth.

Body rather stout, compressed, and covered with large ctenoid scales, which become cycloid on the breast and the base of the pectoral fin; they extend forward to a short distance before the dorsal fin and the shoulder, but leave the nape and neck bare. Genital papilla well developed.

¹⁷ Bleeker—Verh. Akad. Amsterdam, ii., 1855, p. 12.

First dorsal originating over the anterior half of the pectorals; the four anterior spines are somewhat filamentous, but reach only as far as the second ray when adpressed; the membrane from the last does not reach the second dorsal. Dorsal rays subequal in length, the margin of the fin a little rounded. Anal originating and terminating a little behind the second dorsal, its rays increasing gradually in length backwards. Pectoral broadly rounded, its middle rays not quite reaching the vertical of the anterior dorsal ray; no free upper rays. Ventrals large, almost reaching to the vent, and a little longer than the pectoral, the basal membrane well developed. Caudal rounded.

Colour-marking.—Light coloured in alcohol, each scale of the back and sides with an inframarginal dark brown angular mark. About seven rather indefinite bands across the back, between the nape and the caudal fin, and there is a median row of five dark spots between the pectoral and the hypural joint. Upper surface of the head and nape spotted and vermiculated with brown; an indistinct violaceous band extends downward from the eye to the angle of the mouth, and some indistinct bars on the cheeks terminate in two darker stripes on the bases of the pectorals. Fins hyaline; first dorsal with a longitudinal row of grey spots near the base, the remainder dusky; the anterior spine annulated with darker spots. Second dorsal with many oblique rows of grey spots, the anterior ray with darker annulations, and the fin has a broad lighter margin. Anal with a dusky border, and some dark spots between the hinder rays. Caudal with some light grey spots; pectorals and ventrals plain, the latter somewhat dusky.

Described and figured from an example 66 mm. long, from the typical locality.

This species is very similar in all its structural details to *R. nebulosus*, but differs in its colour-marking, and in having a much smaller eye. This is equal to the length of the snout in *R. leftwichi*, but is much longer than it in specimens of *R. nebulosus* of the same size as the example described above.

Loc.—Great Sandy Strait, Queensland.

(GOBIUS) NEOPHYTUS, Günther.

Gobius neophytus, Günther, Fische Südsee, vi., 1877, p. 174, pl. cviii., fig. e.
Rhinogobius neophytus, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 400, pl. xxxvii., fig. 2. *Id.*, McCulloch, Proc. Linn. Soc. N.S.Wales, xxxvi., 1911, p. 423.

Loc.—Murray Island, Torres Strait.

(GOBIUS) LATERALIS, Macleay.

var. OBLIQUUS, var. nov.

(Plate xxxiv., fig. 4.)

Gobius lateralis, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 602.
Rhinogobius lateralis, McCulloch and Waite, Rec. S.Austr. Mus., i. 1, 1918, p. 48, pl. ii., fig. 3.

This variety appears to be quite similar to *G. lateralis*, Macleay, from Southern Australia, in both form and the disposition of its colour-marking, but the large dark lateral spots are always elongate and disposed obliquely in examples from near Sydney, instead of being rounded. Local examples exhibit the same variation in the relative lengths of their dorsal and anal rays as noted in South Australian specimens.

The specimen figured is 56 mm. long. Not being full-grown, its fin-rays are shorter than in older examples, but it exhibits the characteristic marking of the variety.

Locs.—Parramatta River estuary and Rose Bay, Port Jackson. Lake Illawarra, New South Wales. A single example in the old collection of the Australian Museum is said to have been obtained at Lord Howe Island.

Genus WAITEA, *Jordan and Seale.*

WAITEA MAXILLARIS, *Macleay.*

(Plate xxxv., fig. 3.)

Gobius maxillaris, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 357, pl. ix., fig. 2.

D. vi/11; A. 10; P. 17; V. i/5; C. 15. Scales about 43; l. tr. 16. Depth 4.1 in the length to the hypural joint; head 3 in the same. Orbit (not eye) 3.1 in the head; interorbital width 5.2, snout 1.6 in the orbit. Depth of caudal peduncle 2.5 in the head.

Head apparently naked, showing no mucous system, and only the usual preopercular, nuchal, occipital and rostral pores. Eye of moderate size, the orbit cutting the profile; interorbital space very narrow, less than one-fifth the width of the orbit. Snout shorter than the orbit, its profile very oblique. Anterior nostril with dermal margins, the posterior a large open pore. Maxillary slender, produced backward towards the preopercular angle; mandible projecting beyond the premaxillaries. Teeth in a villiform band in each jaw, premaxillaries with an outer row of enlarged, cardiform, curved, movable teeth; mandibular teeth ending on each side in two or three small, fixed canines: palate and tongue toothless. Tongue truncate anteriorly.

Body compressed, covered with strongly ctenoid scales of moderate size, which extend forward to above the pectoral base and on the thorax; the area before the dorsal fin and the base of the pectoral are now naked, but may have been scaly in life. A small genital papilla.

First dorsal originating just behind the pectoral, its spines filamentous; the first is a little longer than the head, the following shorter and decreasing backwards. Second dorsal increasing in height backward to the penultimate ray, which is as long as the head without the operculum. Anal originating a little behind the second dorsal and terminating in advance of it; it is of similar form to that fin, and but little lower. Pectoral without free rays, rounded, and reaching to above the second anal ray. Ventrals large, inserted a little before the pectorals, and almost reaching the anal. Caudal apparently rounded.

The colour is completely faded in the type. According to Macleay, it was pale reddish or yellowish brown, with a few indistinct cross-bars of a deeper brown; fins of a blackish tinge without spots; opercles dotted with minute spots.

Described and figured from the typical and unique example preserved in the Macleay Museum, which is 65 mm. long. It is very dilapidated, so the forms of the caudal and pectoral fins and the extent of the squamation may not be accurate in our figure. It is apparently a species of *Waitea*.

Loc.—Port Darwin.

AMBLYGOBIUS, Bleeker.

Amblygobius, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 322 (*Gobius sphyx*, Cuv. & Val.).

Odontogobius, Bleeker, *Ibid.*, p. 323 (*Gobius bynoensis*, Rich.).

Body of moderate breadth, compressed. Scales rather small, mostly ctenoid but cycloid anteriorly, covering the breast and base of the pectoral; a few imperfect scales on the upper part of the operculum. Head with fine rows of mucigerous papillæ. Snout somewhat tumid, jaws subequal. Mouth moderate, a little oblique; no barbles. An outer row of larger teeth in each jaw anteriorly, followed by an inner series of smaller ones; large canines on the sides of the mandible; palate toothless. Tongue subtruncate anteriorly, its tip free. Gill-openings broad, separated by a wide isthmus; shoulder-girdle smooth. Pseudobranchiæ present; gill-rakers few, and obsolete on the outer anterior margin of the first arch. Dorsals almost contiguous, with about vi/15 rays; anal opposite and of similar form to the second dorsal, with about 15 rays. Ventrals large, united, with i/5 rays. Caudal rounded.

- a. Ventrals not reaching the vent in adults. Caudal fin plain; cross-bands of body ill defined..... *bynoensis*.
- aa. Ventrals reaching to or beyond the vent in adults. Caudal fin with one or more dark spots; cross-bands of body well defined... *phalaena*.

AMBLYGOBIUS BYNOENSIS, Richardson.

(Plate xxxv., fig. 2.)

Gobius bynoensis, Richardson, Ichth. "Ereb. & Terr.," 1844, p. 1, pl. i., figs. 1-2. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 70. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien., lvi. i., 1867, p. 314. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 61. *Id.*, Peters, Monatsbr. Akad. Wiss. Berlin, 1868, p. 266. *Id.*, Day, Fish. India, 1876, p. 284, pl. lxi., fig. 3. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 382. *Id.*, Günther, "Challenger" Rept., Zool., i., 1880, p. 44. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 607. *Id.*, Weber, Zool. Forsch. Austr., v., 1895, p. 269.

Gobius stethophthalmus, Bleeker, Nat. Tijdschr. Ned. Ind., i., 1851, p. 249, fig. 17.

Odontogobius bynoensis, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874 (*vide* Day).

Apocryptes lineatus, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 332, pl. xii., fig. 3. *Id.*, Macleay, *Loc. cit.*, v., 1881, p. 611.

Apocryptes bivittatus, Macleay, *Loc. cit.*, ii., 1878, p. 357, pl. ix., fig. 5, and v., 1881, p. 611.

Amblygobius bynoensis, Jordan & Richardson, Check List Fish. Philippine Arch., 1910, p. 49. *Id.*, Weber, "Siboga" Exped., lvii., 1913, p. 472.

D. vi/15; A. 16; P. 18; V. i/5; C. 15. 64 scales between the upper base of the pectoral and the hypural joint, and about 26 between the anterior dorsal and anal rays.

Depth 4·5 in the length to the hypural joint; head 3·7 in the same. Eye 4·3 in the head, 1·3 in the snout, which is 3·2 in the head; interorbital space 1·2 in the eye. Depth of caudal peduncle 1·9, and caudal fin 1·1 in the head. Breadth at the bases of the pectorals 1·3 in the depth of the body.

Head almost naked, a few rudimentary scales on the upper portion of the operculum. A few low ridges of mucigerous papillæ; rows of large open pores behind the preoperculum and above the operculum. Eyes of moderate size, separated by a rather broad, slightly convex interorbital space. Upper profile of the head and snout forming a convex curve. Anterior nostril in a short tube near the middle of the snout, the posterior a simple opening nearer the eye. Mouth a little oblique, maxilla reaching back to below the anterior margin of the eye; jaws subequal. Premaxillaries with several larger curved teeth on each side anteriorly, followed by a row of small ones which increase in size and become biserial backwards. Mandible with an outer row of larger curved teeth, and one or two curved canines on each side; behind these is a double row of small teeth which become uniserial on the sides. Palate toothless. Tongue subtruncate anteriorly, its tip free. Gill-openings separated by a wide interspace; exposed edge of the shoulder-girdle smooth.

Body rather broad, compressed. It is covered with rather small scales which extend forward to behind the eyes, and cover the breast and base of the pectoral; they are mostly ctenoid, but are cycloid anteriorly and on the abdomen. A minute genital papilla.

First dorsal fin commencing behind the vertical of the pectoral base; the spines increase in length to the fifth, and the membrane from the last touches the base of the first ray. Dorsal rays subequal in length, the posterior ones forming a pointed lobe which overlaps the caudal base. Anal of similar form to the second dorsal, the rays increasing slightly in length backwards. Pectoral rounded, reaching the vertical of the first dorsal ray. Ventrals inserted slightly before the pectorals, completely united, and reaching three-fourths of their distance from the vent. Caudal broadly rounded.

Colour-marking.—A broad dark band commences on the snout, and extends backward to below the anterior dorsal rays; a second extends from behind the mouth across the opercles to the pectoral base, and is

lost behind that fin. About seven cross-bands descend from the back below the dorsal fins, the anterior ones being narrower and connecting with the longitudinal band. A large dark spot at the base of the tail. Upper surface of the head and neck with paired rows of large dark-edged ocelli, and there are some light lines bordering the darker bands on the head. Upper anterior portion of the body with some silvery dots between the dark bands. First dorsal with a large dark blotch on the basal portions of the third to the fifth dorsal spines, and another on the sixth; the fin has a broad dark margin, and there are some cloudy markings on the membrane. Soft dorsal with four large dark blotches corresponding to the body-bars, and a broad grey margin, between which are several rows of cloudy spots between the rays. Anal with a broad grey margin, the other fins plain.

Described and figured from a beautifully preserved specimen, 92 mm. long, from Queensland. Some details of the colour-marking are supplemented with notes from other specimens. The markings are apparently subject to some little variation, and but few examples exhibit all those illustrated.

Synonymy.—The cotypes of *Apocryptas lineatus*, Alleyne & Macleay, are quite similar in all details to the specimen described above. The cotypes of *A. bivittatus*, Macleay, are largely bleached, but retain traces of the characteristic markings of *A. bynoensis*, with which they are evidently identical.

Locs.—Queensland; figured specimen. Palm Islands, Queensland. Cape Grenville, Queensland; cotypes of *A. lineatus*. Thursday Island, Torres Strait; coll. A. R. McCulloch. Port Darwin, Northern Territory; cotypes of *A. bivittatus*. Malay Archipelago; Dr. Day's collection.

AMBLYGOBIUS PHALAENA, Cuvier & Valenciennes.

(Plate xxxv., fig. 1.)

Gobius phalaena, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 92. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 67, and Fische Südsee, vi., 1877, p. 178, pl. cxi., fig. c.

Amblygobius phalaena, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 405. *Id.*, McCulloch, Proc. Linn. Soc. N.S.Wales, xxxvi., 1911, p. 347. *Id.*, Ogilby, Mem. Qld. Mus., ii., 1913, p. 90. *Id.*, Weber, "Siboga" Exped., lvii., 1913, p. 472. *Id.*, Regau, Proc. Zool. Soc., 1914, p. 650.

Gobius annulatus, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 688.

D. vi/15; A. 15; P. 19; V. i/5; C. 15. 56 rows of scales between the upper base of the pectoral and the hypural joint, and about 22 between the anterior dorsal and anal rays.

Depth 3·7 in the length to the hypural joint; head 3·5 in the same. Eye equal to the length of the snout, and 3·4 in the head; interorbital width 1·6 in the eye. Depth of the caudal peduncle 1·8, and caudal fin 1 in the head. Breadth at the bases of the pectorals 1·6 in the depth of the body.

Head largely naked, a few small scales on the upper part of the operculum. Some fine rows of mucigerous papillæ are present on the cheeks, opercles, nape and sides of the neck, which are most striking below the eye. Some large open pores on the interorbital space, behind the eye and the preopercular border, and above the operculum. Eyes separated by a rather broad and almost flat interorbital space. Anterior nostril in a short tube, the posterior a simple opening. Upper profile of the head and snout forming a convex curve. Mouth a little oblique, the maxilla reaching to below the anterior portion of the eye; jaws subequal. Premaxillaries with an outer row of several enlarged teeth on each side, followed by an inner row of small ones, which increase in size and become biserial backwards. Mandible with an outer row of curved teeth anteriorly and a large curved canine on each side. Palate toothless. Tongue subtruncate anteriorly, its tip free. Gill-openings separated by a wide interspace; exposed edge of the shoulder-girdle smooth.

Body rather broad, compressed. It is covered with small scales which extend forward to behind the eyes, and cover the breast and base of the pectoral fin; they are mostly ctenoid, but are cycloid anteriorly and on the abdomen. A minute genital papilla.

First dorsal commencing behind the vertical of the pectoral base; the spines increase in length to the fourth, which is filamentous, and the membrane from the last almost reaches the base of the first ray. Dorsal rays subequal in length, the posterior ones forming a pointed lobe, which overlaps the base of the caudal. Anal of similar form to the soft dorsal, the rays increasing slightly in length backwards. Pectoral narrowly rounded, reaching the vertical of the anterior anal rays. Ventrals large, almost reaching the anal fin. Caudal broadly rounded.

Colour-marking.—Brown in alcohol, with five broad cross-bands; these are dark brown with blackish edges, and have narrow light stripes bordering them on each side on the lower portion of the body. Elongate dark-edged spots are present on the cheeks and opercles, and a paired series of them extends from the snout to the dorsal fin. A blackish spot is present on the shoulder, and two dark stripes extend backward on the upper anterior portion of the body. A large blackish blotch is present on the fifth to sixth dorsal spines, and narrow dark lines extend obliquely across the fin. Basal two-thirds of the second dorsal dark brown, and separated from a dark-edged marginal band by a light interspace. Anal dusky, nearly uniform. Ventrals with a narrow dark border. Pectorals and caudal pale yellow, the latter with a large blackish spot near the upper portion of its base, and a dark-edged light band near the upper margin.

Described and figured from a specimen 77 mm. long, from Murray Island.

Variation.—Six other examples, 26-110 mm. long, taken with the specimen described, exhibit striking changes in their colour-marking with growth. The younger examples are light with the cross-bands represented principally by narrow dark lines on the upper portion of the body; there are four interrupted dark longitudinal stripes on each side, and rounded light spots between the cross-bands; the soft dorsal has three dark spots

on its basal portion, and there is no marginal band. A specimen 86 mm. long is very similar to the one illustrated, but the dark margins of the cross-bands have disappeared; the caudal has three dark spots, and the soft dorsal has a dark median stripe above which are numerous rounded light spots in addition to the markings illustrated; the anal has a dark longitudinal stripe with light spots on each side of it, and a grey border. The largest example is very dark brown, which colour obscures most of the other marking; the pectoral and caudal are light, but the latter has a broad brown margin, and an inner dusky area with light spots.

A second series of nine specimens from the New Hebrides, 33-115 mm. long, exhibits a precisely similar range of variation.

Synonymy.—The typical examples of *G. annulatus*, De Vis, agree in all details with those described above.

Locs.—Murray Island, Torres Strait; coll. Hedley & McCulloch. Darnley Island, Torres Strait; coll. Dr. J. R. Tosh. Cape York, Queensland; cotypes of *G. annulatus*. Two Isles, off Cape Bedford, Queensland; coll. Hedley & Briggs. Masthead Island, off Port Curtis, Queensland; coll. D. B. Fry. New Hebrides; coll. Cummins & Stevens.

This species has further been recorded from Monte Bello Islands, Western Australia, by Regan.

(GobiUS) MICROLEPIDOTUS, *Castelnau*.

Gobius microlepidotus, Castelnau, Res. Fish. Austr. (Vict. Off. Rec. Philad. Exhib.), 1875, p. 20.

The very brief description of this species suggests that it is an *Amblygobius*, and is perhaps identical with *G. hynoensis*.

Loc.—Cape York (Castelnau).

Genus CRYPTOCENTRUS (*Ehrenberg*), *Cuvier & Valenciennes*.

CRYPTOCENTRUS GobioidES, *Ogilby*.

(Plate xxxvi., fig. 1.)

Gobius cristatus, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 610 (not of Day).

Gobius gobioides, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 35; substitute name. *Id.*, Waite, Mem. N.S.Wales Nat. Club, ii., 1904, p. 46.

Amblygobius gobioides, Ogilby, Proc. Roy. Soc. Qld., xxiii., 1910, p. 25.

D. vi/13; A. 12; P. 16; V. i/5; C. 15. Scales very small, about 90 between the axil and the hypural joint.

Depth of the body before the ventrals 5·6 in the length to the hypural joint; head 3·8 in the same. Eye 6 in the head, shorter than the snout, which is 4·8 in the head; interocular space 1·5 in the eye. Depth of caudal peduncle 2·4 in the head. Breadth at the pectoral bases 1·3 in the depth.

Head subcylindrical, entirely naked. A low cutaneous crest extends from between the posterior portions of the eyes almost to the base of the first dorsal spine. Rows of microscopic mucigerous papillæ are present on the snout, around the mouth, across the cheeks and opercles, and on the shoulders. Open pores are present on the interorbital space, above the posterior nostril, around the eye and preoperculum, and above the operculum; these are arranged as shown in the accompanying illustration. Eye of moderate size, superolateral, and broader than the interorbital space, which is flat. Snout obtuse, rounded, a little longer than the eye. Anterior nostril in a short tube overhanging the lip, the posterior a simple opening near the eye. Mouth very oblique, the maxilla extending backward to below the middle of the eye; mandible projecting slightly beyond the upper jaw, the chin rounded, without barbles. Premaxillaries with an outer series of large conical teeth, which decrease in size backwards, and an inner band of villiform teeth, which is broadest anteriorly, and becomes narrower backwards; mandible with a strong curved canine at each angle, between which are some enlarged teeth; an inner band of villiform teeth as in the premaxillaries. Tongue free, thick, and rounded anteriorly. Gill-openings lateral, much wider than the isthmus. Exposed edge of the shoulder-girdle smooth, without papillæ; a pit at its lower angle.

Body compressed, and covered with minute concentrically striated cycloid scales, which are very irregularly arranged; they become ctenoid and increase slightly in size backwards; they extend forward only as far as the shoulder, and leave the breast and the base of the pectoral naked. Vertical series of minute mucigerous pores along the middle of the body represent the lateral line. Genital papilla well developed.

First dorsal originating over the anterior third of the pectorals; the spines are filamentous, and increase in length to the third, which extends backward to the base of the fourth ray when adpressed; the sixth is separated from the others by a wider interspace, and its membrane reaches the base of the first ray. Rays of the second dorsal subequal in height, the hinder ones overlapping the base of the caudal; the margin of the fin is straight. Anal similar to the second dorsal, its rays increasing slightly in length backwards. Pectorals obtusely pointed, the median rays longest, and reaching beyond the vertical of the sixth dorsal spine; no free upper rays. Ventrals inserted before the pectorals, with a deep basal membrane, and reaching nearly two-thirds of their distance from the vent. Caudal obtusely pointed.

Colour-marking.—Brown in alcohol, the head and body closely spotted with darker spots, which become linear on the lower portion of the body. Anterior dorsal spines with blackish annuli, their produced portions white; a large dark blotch on the membrane between the third and fifth spines, and some ocelli on the basal half. Second dorsal dusky, with about three irregular rows of dark light-edged ocelli. Anal with dusky streaks between the rays, which are lighter. Caudal and ventral somewhat similar to the anal. Pectoral lighter, with about five transverse lines of dots across the rays.

Described and figured from one of the cotypes, 90 mm. long. Nine other cotypes, 63-92 mm. long, exhibit but little variation.

Habits.—An account of the interesting habits of this species is given by one of us in the Proceedings of the Royal Society of Queensland, xxiii., p. 26.

Locs.—Port Jackson; Macleay Museum, cotypes of *G. cristatus*, Macleay. Fourteen other specimens, 47-108 mm. long are in the Australian Museum from Port Jackson, Port Hunter, Port Macquarie, and the Richmond River estuary, New South Wales; Caloundra, Queensland.

Genus OXYURICHTHYS, Bleeker.

Oxyurichthys (Bleeker), Weber, "Siboga" Exped., lvii., 1913, p. 475.

- a. No orbital tentacle or nuchal crest.....*papuensis*.
- aa. An orbital tentacle and a nuchal crest.....*cornutus*.

OXYURICHTHYS PAPUENSIS, Cuvier & Valenciennes.

Gobius papuensis, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 106. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 49.

This species has been recorded from Australia by Günther.

OXYURICHTHYS CORNUTUS, McCulloch & Waite.

Oxyurichthys cornutus, McCulloch & Waite, Rec. S.Austr. Mus., i. 1, 1918, p. 80, pl. viii., fig. 2.

Loc.—Cairns, Queensland.

(GOBIUS) EREMIUS, Zietz.

Gobius eremius, Zietz, Rept. Horn. Exped., ii., 1896, p. 180, pl. xvi., fig. 5. *Id.*, McCulloch, Rec. Austr. Mus., xi. 7, 1917, p. 183, pl. xxxi., fig. 1.

Hab.—Fresh water, Central Australia.

Subfamily ELEOTRINÆ.

Base of the pectoral fin not unusually muscular or mobile. Eyes not erectile. Ventral fins separate.

Provisional key to the Australian genera known to the authors.

- a. Ventral rays i/4.
 - b. Body elongate, scales minute; dorsal rays about vi/29. *Ptereleotris*.
 - bb. Body short, scales large; dorsal rays about vi/9-10.....*Eviota*.
- aa. Ventral rays i/5.
 - c. Scales small, more than 50 in a longitudinal row.
 - d. Sides of head naked.....*Valenciennesa*.
 - dd. Sides of head scaly.
 - e. Preoperculum without a spine at the angle.
 - f. Body scales cycloid; jaws with large canines.....*Odonteleotris*.

- ff. Body scales ctenoid; jaws without canines.....*Oxyeleotris*.
 ee. Preoperculum with a spine at the angle.....*Eleotris*.
 cc. Scales larger, less than 50 in a longitudinal row.
 g. Top of head with bony crests.....*Butis*.
 gg. Top of head without bony crests.
 k. Preoperculum with 2-3 strong spines.....*Asterropterus*.
 kk. Preoperculum unarmed.
 i. Cheeks and opercles naked.....*Philypnodon*.
 ii. Opercles scaly, cheeks more or less scaly.
 j. Interorbital space scaly.
 k. Snout broad, flat and depressed; scales on upper surface of head enlarged;
 first dorsal usually with 6 spines.....*Ophiocara*.
 kk. Snout narrower, more convex; scales on upper surface of head not enlarged;
 first dorsal with 7-9 spines.....*Mogurnda*.
 jj. Interorbital space naked.
 l. Scales smaller, 37-40; body moderately elongate.....*Gobiomorphus*.
 ll. Scales larger, 27-35; body deeper.....*Carassius*.

Genus PTERELEOTRIS, Gill.

Ptereleotris, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 270 (*Eleotris microlepis*, Bleeker). *Id.*, Bleeker, Arch. Néerl., ix., 1874, p. 307.

Body elongate, compressed, covered with minute cycloid scales, which are separate anteriorly; no lateral line. Head naked, short. Eye of moderate size. Mouth moderate, very oblique, the lower jaw projecting; chin without barbules. Teeth in several rows in each jaw, with large canines; palate toothless. Tongue styliiform. Gill-openings wide, isthmus narrow, shoulder-girdle smooth. Pseudobranchiæ present; gill-rakers long, slender, and numerous. Six dorsal spines and about 29 rays; anal opposite the dorsal, with about 27 rays. Ventrals $i/4$. Some of the caudal rays produced. Vertebrae about 26.

PTERELEOTRIS MICROLEPIS, Bleeker.

(Plate xxxvii., fig. 1.)

Eleotris microlepis, Bleeker, Nat. Tijdschr. Ned. Indie, xi., 1856, p. 102.

Id., Günther, Cat. Fish. Brit. Mus., iii., 1861, p. 132. *Id.*, Günther & Playfair, Fish. Zanzibar, 1866, p. 75, pl. ix., fig. 5.

Eleotriodes microlepis, Bleeker, Nat. Tijdschr. Ned. Indie, xvi., 1858, p. 212.

Ptereleotris microlepis, Bleeker, Versl. Akad. Amsterdam (2), xi., 1877, p. 103.

Eleotris elongata, Alleyne and Macleay, Proc. Linn. Soc. N.S. Wales, i., 1877, p. 335, pl. xiii., fig. 1.

D. $vi/29$; A. 27; P. 22; V. $i/4$; C. 15. Scales minute. Four branchiostegals. Vertebrae 26, including the hypural.

Depth 7.8 in the length to the hypural; head 5.2 in the same. Eye slightly longer than the snout, 3.7 in the head. Bony interorbital width 1.3 in the eye. Snout 4.2, depth of caudal-peduncle 2 in the head.

Head naked, with preopercular, nuchal, occipital and rostral pores. Eye large, lateral, its margin close to the upper profile of the head. Interocular space rather flat, its width equal to the diameter of the eye. Snout shorter than the eye; nostrils without tubes, on its superolateral angle, the posterior near the orbital margin. Mouth protractile, the cleft very oblique; maxillary pointed posteriorly, and reaching to below the anterior orbital margin. Mandible projecting well beyond the upper jaw; chin without barbles. Teeth in the upper jaw in two series; the outer consists of large, spaced, fang-like canines, the inner of a narrow band of minute teeth. Lower jaw with an inner row of three or four canines on each side, and a group of strong teeth on both sides of the symphysis; between these are some smaller teeth, and a row of small teeth is present on the posterior portion of each side. Palate toothless. Tongue long, styliform, and partly free. Gill-openings wide, the membranes separated on the isthmus by a space which is less than half as wide as the eye. Shoulder-girdle smooth. Pseudobranchiæ present. Gill-rakers on the first arch long, slender, close-set and numerous.

Body covered with minute cycloid scales, which are irregularly arranged, and separate anteriorly but close together posteriorly; they extend forward to above the end of the operculum, and onto the pectoral base and the thorax, leaving the nape naked; posteriorly they cover the caudal base. A minute genital papilla.

First dorsal originating a little in advance of the middle of the pectorals; the spines increase in length to the fifth, which is as long as the head without the operculum, the last spine widely separated from the fifth. Second dorsal elevated, the rays weakly divided; they increase in height to about the eighth, which is four-fifths the length of the head, and thence decrease backwards. Anal commencing well behind the second dorsal, but coterminous with it; the two fins are of similar form. Caudal emarginate, the upper and lower rays produced. Ventrals juxtaposed basally but separate, with a flexible slender spine and four articulated rays the inner of which is the longer and filiform. Pectorals rounded, the median rays longest and reaching to about the vertical of the fifth dorsal spine.

Colour-marking.—The only marking remaining is a small, oblique, brown bar on the base of the pectoral fin, the rest of the body and fins being pellucid.

Described and figured from the holotype of *Eleotris elongata*, 93 mm. long, which is in a poor state of preservation. It is clearly the example originally described by Macleay, not only because it is so labelled, but it is the only specimen in his collection having any resemblance to his description and figure; the colour-marking of the pectoral fin also agrees with the latter. It proves his description to be incorrect in the number of dorsal and anal rays, and in the form of the caudal fin, while his figure is inaccurate in most details.

Synonymy.—*Eleotris elongata* is evidently synonymous with *Ptereleotris microlepis*. Macleay's specimen agrees with Bleeker's description of that species in most details, differing only in having somewhat higher dorsal

and anal fins, and in having four instead of five ventral rays; the first character is probably variable, while it seems not unlikely that the number of ventral rays was incorrectly counted by Bleeker.

Loc.—Darnley Island, Torres Strait. Perhaps a pelagic form.

Genus *EVIOTA*, Jenkins.

Eviota, Jenkins, Bull. U.S. Fish. Comm., xxii., 1903, p. 501 (*E. epiphanes*, Jenkins).

Allogobius, Waite, Rec. Austr. Mus., v. 3, 1904, p. 176 (*A. viridis*, Waite).

EVIOTA VIRIDIS, Waite

Allogobius viridis, Waite, Rec. Austr. Mus., v. 3, 1904, p. 177, pl. xxiii., fig. 3.

Eviota zonura, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 386, fig. 75.

Eviota viridis, McCulloch, Rec. Austr. Mus., ix. 3, 1913, p. 386.

Loc.—Queensland coast between Port Curtis and Torres Strait (McCulloch).

Genus *VALENCIENNEA*, Bleeker.

Valenciennaea, Bleeker, Nat. Tijd. Ned. Ind., xi., 1856, p. 412 (*Eleotris strigata*, Broussonet). *Id.*, Jordan & Snyder, Proc. U.S. Nat. Mus., xxiv., 1901, p. 42.

Calleleotris, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 270 (*E. strigata*, Broussonet).

Valenciennesia, Bleeker, Versl. Akad. Amsterdam (2), viii., 1874, p. 372 —emended spelling.

Gobiomorus, Gill, Proc. U.S. Nat. Mus., xi., 1888, p. 69 (*G. taiboa*, Lacep.). Not *Gobiomorus*, Lacepède.

Body moderately elongate, a little compressed, covered with small, ctenoid scales. Head naked, opercles unarmed; jaws subequal, with strong, spaced teeth, which are uniserial or biserial anteriorly in the lower jaw, but uniserial elsewhere; a curved canine on each side of the mandible; palate toothless. Isthmus broad. Ventral fins separate, with one spine and five rays. Dorsal fins with six spines and thirteen to nineteen rays, anal similar to the second dorsal.

Nomenclature.—Gill (*Loc. cit.*) considered Lacepède's name *Gobiomorus*¹⁸ should be used for this genus, but Jordan¹⁹, as the first revisor, applied it to *Philypnus*, and we consider he should be followed.

¹⁸ *Gobiomorus*, Lacepède—Hist. Nat. Poiss., ii., 1800, p. 583.

¹⁹ Jordan—Proc. U.S. Nat. Mus., v., 1888, p. 571.

Key to the species examined.—

- a. D. vi/19. Body without marking; a single dark-blue stripe crossing the upper portion of the cheek and operculum.....*strigata*.
- aa. D. vi/18. Body ornate. .
 - b. Third dorsal spine distinctly longer than the others. Cross-bands and ocelli indefinite or wanting.
 - c. Cheek and operculum with about nine large ocelli.....*violifera*.
 - cc. Cheek and operculum banded, without spots.....*muralis*.
 - bb. Third dorsal spine not, or scarcely longer than the others. Five cross-bands on the trunk, forming distinct, large ocelli on the sides.....*longipinnis*.

Of these species, only *V. muralis* and *V. longipinnis* have been recorded from Australia. Three specimens of *V. strigata*, Broussonet, are in the Australian Museum from the New Hebrides, and twenty-three of *V. violifera*, Jordan & Seale, from Samoa, New Hebrides, Bougainville Island, and Duke of York Island.

VALENCIENNEA MURALIS, Cuvier & Valenciennes.

(Plate xxxvii. ; fig. 4).

Eleotris muralis, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 253, pl. ccclvii. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 130, and Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, Day, Fish. India, 1876, p. 310, pl. lxix, fig. 1. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 386. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 624.

Valenciennea muralis, Jordan & Snyder, Proc. U.S. Nat. Mus., xxiv., 1901, p. 42.

Eleotriodes muralis, Bleeker, Nat. Tijd. Ned. Ind., xv., 1858, p. 201.

Eleotris trabeatus, Richardson, Icones Piscium, 1843, p. 5, pl. ii. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 105, f. n.

Eleotris lineata, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 334 (perhaps not *E. lineata*, Castelnau).

Valenciennea aruensis, Ogilby, Proc. Roy. Soc. Qld., xxiii., 1910, p. 21.

D^o vi/13; A. 13; P. 20; V. i/5; C. 13. About 90 series of scales from above the base of the pectoral to the hypural joint; about 32 between the anterior dorsal and anal rays.

Depth 6 in the length to the hypural joint; head 3·5 in the same. Eye 5·5 in the head, and 2 in the snout, which is 3 in the head, and equal to the depth of the caudal peduncle. Interocular space slightly narrower than the eye.

Head naked, with the usual preopercular, nuchal, occipital, and rostral pores; cheeks and opercles without mucigerous systems. Eye rather small, cutting the dorsal profile, and separated by a flat interocular space; bony interorbital about half as wide as the eye. Snout much longer than the eye, a little convex. Mouth oblique, maxillary reaching to below the anterior orbital margin. Lower jaw closing within the upper. Premaxillary teeth in a single series, largest anteriorly and slender, curved and spaced; they form two rows on the anterior part of the mandible, but

are uniserial and smaller laterally, and there is a canine on each side. Palate toothless. Tongue rounded anteriorly. Gill-opening much wider than the base of the pectoral, separated by a broad isthmus. Shoulder-girdle smooth.

Body compressed, the breadth between the pectorals 1.1 in the depth. It is covered with small ctenoid scales, which extend forward to above the end of the operculum and to behind the ventrals, leaving the nape, thorax, and pectoral bases naked. Genital papilla minute.

First dorsal commencing behind the vertical of the pectorals; the third ray projects beyond the others, and is as long as the head without the operculum. The dorsal rays are subequal in height, the last slightly longer than the others, and reaching to the hypural joint. Anal of similar form to the second dorsal, originating behind its second ray, and terminating in advance of its last. Pectoral rounded, the median rays longest, not quite reaching the vertical of the anterior dorsal ray. Ventrals inserted in advance of the pectorals, their third rays longest, reaching a little more than half their distance from the anterior anal ray. Caudal pointed, the median rays 0.1 longer than the head.

Colour.—Body generally light coloured, with four longitudinal stripes and some very indefinite cross-bands; the first stripe commences on the nape behind the eyes, and extends along the back to the last dorsal ray; the second begins on the snout, and passing through the eye, is lost below the posterior dorsal rays; the third commences behind the upper lip and extends to the caudal, and the fourth runs from behind the pectoral to the caudal base. Snout and interorbital space with spots and bars. Cheek and operculum with three horizontal, dark-edged stripes, two of which extend onto the pectoral base; no spots or ocelli. First dorsal fin with about seven undulous, dark-edged stripes and a large black spot behind the third spine. Second dorsal with some indefinite stripes anteriorly. Caudal with a broad greyish margin, and an oblique, dark-edged stripe near the upper and lower bases.

Described from a specimen 109 mm. long, from Dunk Island, North-east Queensland, and collected by Mr. E. J. Banfield. Six others examined have the same colour-marking, except that they lack all traces of cross-bars on the body.

Synonymy.—*Eleotris trabeatus*, described by Richardson from a drawing of a fish from Depuch Island, North-western Australia, is probably synonymous with *V. muralis*; the size of its scales, and the squamation of the head as shown in the figure, are doubtless errors of the amateur artist. The specimen identified by Alleyne and Macleay from Darnley Island as *E. lineata*, Castelnau, is certainly *V. muralis*, as are Macleay's *E. muralis* from the Endeavour River. Three paratypes of *V. arnensis* only differ from the specimen described above in having the cross-bars better defined; they appear to represent a variety of *V. muralis*.

Locs.—Dunk Island, North-eastern Queensland; Austr. Mus. Darnley Island, Torres Strait, and Endeavour River, North-east Queensland; Macleay Mus. Aru Islands; Qld. and Austr. Mus. Günther has recorded *V. muralis* from Cape York, and Klunzinger had specimens from Port Darwin, while *Eleotris trabeatus* came from North-western Australia.

Hab.—Indian Seas to North Australia, Japan, and the western Pacific.

VALENCIENNEA LONGIPINNIS, *Bennett.*

Eleotris longipinnis, Bennett, Voy. "Blossom", Zool., 1839, p. 64, pl. xx., fig. 3. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 105, f. n., and Fische Südsee, vi., 1877, p. 190.

Valenciennia longipinnis, Waite, Rec. Austr. Mus., iv., 1902, p. 271, pl. xliii. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 382.

Valenciennia longipinnis, Bleeker, Versl. Akad. Amsterdam (2), xi., 1877, p. 93.

Eleotris strigata, Thiollier, Ann. Agric. Soc. Lyon, viii., 1856, p. 188 (not *E. strigata*, Cuv. & Val.—*fide* Bleeker).

Eleotris ikeineur (Montrouzier), Thiollier, *Ibid.*

Eleotris tenuira, Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 624.

D. vi/13; A. 13; P. 21; V. i/5; C. 15. About 112 rows of scales from above the pectoral base to the hypural joint, and about 40 between the anterior dorsal and anal rays.

Depth 5·4 in the length to the hypural joint; head 3·6 in the same. Eye 5·1 in the head, and 1·8 in the snout, which is 2·8 in the head. Interocular space 1·2 in the eye. Depth of caudal peduncle 2·3, fourth dorsal spine 1·3 in the head. Median caudal rays 0·7 longer than the head.

Form and structural details almost exactly similar to those of *V. muralis*, but the anterior dorsal fin is rounded, the third ray being not longer than those on either side of it; the median caudal and posterior dorsal and anal rays are more produced, and the scales appear somewhat smaller.

Colour.—Pale brown in formaline, becoming white below, with four narrow longitudinal bands which are similar to, but less distinct than those of *V. muralis*. Nape and back with ten dusky cross-bars; sides with five bands which terminate in large ocelli on the lower longitudinal band. Cheek and operculum with three horizontal blue bars with dark edges, and some large blue spots; snout dusky, with blue bars and spots. First dorsal with about six oblique, dark-edged stripes, and a dusky spot behind the fourth spine. Second dorsal with about four rows of blue ocelli between the rays. Anal with a light, dark-edged band near its base. Caudal with large, inter-radial ocelli and bars, and broad dusky margins. Pectorals and ventrals plain (for the colours of a fresh specimen, see Waite, *Loc. cit.*).

Described from a specimen 170 mm. long. Four others, 80-160 mm. long show some variation in the intensity and extent of their colour-marking, which, however, is similarly arranged in all. They differ from *V. muralis* in having the longitudinal bands less distinct, and in the possession of five well defined cross-bars and ocelli on the sides.

Synonymy.—The holotype of *Eleotris tenuira*, Macleay, 117 mm. long, is very faded, but clearly shows the characteristic lateral ocelli and blue bars on the cheeks and opercles. It is certainly identical with the species described above.

Locs.—Specimens are in the Australian Museum from Green Island, near Cairns, and Masthead Island, off Port Curtis, Queensland. Macleay's specimen was collected at Low Island, near Cooktown.

Hab.—Riu Kiu Islands to the East Indies, Fiji, and Queensland.

VALENCIENNEA LINEATA, *Castelnau*.

Eleotris lineata, Castelnau, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 24. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 623—part.

Eleotris nigrifilis, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 754—substitute name for *E. lineata*, considered to be preoccupied by *Dormitator lineata*, Gill, 1863.

This species is allied to, and probably identical with either *V. muralis* or *V. longipinnis*. Castelnau counted fourteen dorsal and anal rays, as against thirteen in those species, but their posterior rays are so deeply divided that they might each be counted as two. The fourth dorsal spine being longer than the third suggests the identity of *V. lineata* with *V. longipinnis*, but the colour-marking was apparently more like that of *V. muralis*.

Loc.—Cape York (Castelnau).

Genus ODONTELEOTRIS, *Gill*.

Odonteleotris, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 270 (*Eleotris macrodon*, Bleeker).

Body covered with very small cycloid scales, which extend onto the head to before the eyes, and cover the cheeks and opercles. Cheeks with prominent rows of minute mucigerous papillæ. Snout obtuse, mandible projecting; mouth oblique, rather large. No barbules; anterior nostril in a large tube overhanging the lip. A narrow band of villiform teeth in each jaw, and some enlarged inner ones on the sides; several strong canines in front of each jaw. Tongue rounded and free anteriorly. Gill-openings extending a little forward below, but separated by a wide interspace; exposed edge of shoulder-girdle smooth, with a free dermal membrane. Pseudobranchiæ present; about seven slender gill-rakers on the anterior margin of the first arch. Dorsal fins short, with about vi/11 rays; anal similar to the soft dorsal, with about 9 rays. Pectoral without free rays; ventrals separate, with i/5 rays. Caudal rounded.

ODONTELEOTRIS MACRODON, *Bleeker*.

Eleotris macrodon, Bleeker, Verh. Bat. Gen., xxv., 1853, p. 104, pl. ii., fig. 1. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 129. *Id.*, Day, Fish. India, 1876, p. 311, pl. lxxv., fig. 3. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 385. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 34.

Odonteleotris macrodon, Bleeker, Versl. Akad. Amst. (2), xi., 1877, p. 14.

Loc.—This species has been recognised from Port Darwin by Klunzinger. An example from Dr. Day's collection is in the Australian Museum from Akyab, India.

Genus OXYELEOTRIS, *Bleeker*.

Oxyeleotris, Bleeker, Arch. Néerl. Sc. Nat., ix., 1874, p. 302.

Bleeker's papers on this genus being unavailable to us, we follow Weber in regarding *Eleotris immaculatus*, Macleay (= *E. lineolatus*, Steindachner) as a species of *Oxyeleotris*. If this be correct, the genus can only be distinguished from *Eleotris* by its different physiognomy and in lacking a preopercular spine.

OXYELEOTRIS LINEOLATUS, *Steindachner*.

Eleotris lineolatus, Steindachner, Sitzb. Akad. Wiss. Wien, lv. i., 1867, p. 13.

? *Eleotris planiceps*, Macleay, Proc. Linn. Soc. N.S.Wales, vii. i., 1882, p. 69 (not *E. planiceps*, Castelnau, 1878, nor *E. planiceps*, Macleay, 1883).

Eleotris immaculatus, Macleay, Proc. Linn. Soc. N.S.Wales, viii. 2, 1883, p. 268.

? *Eleotris selheimi*, Macleay, *Ibid.*, ix. 1, 1884, p. 33—substitute name for *E. planiceps*, preoccupied.

Eleotris crescens, De Vis, Proc. Roy. Soc. Qld., ii., 1886, p. 33.

Eleotris (Oxyeleotris) heterodon, Weber, Nova Guinea, v. 2, 1908, p. 255, pl. xiii., fig. 7.

D. vi/10; A. 9; P. 17; V. i/5; C. 16. 60 scales between the axil and the hypural joint, and 20 between the anterior dorsal and anal rays.

Depth before the ventrals 5.1 in the length from the premaxillary symphysis to the hypural joint; head, excluding the mandible, 2.8 in the same. Eye 9 in the head, and 1.9 in its distance from the premaxillary symphysis; it is 2.3 in the interorbital space, which is 3.8 in the head. Breadth before the pectoral bases 0.1 greater than the depth; depth of the caudal peduncle 2.5 in the length of the head. Second and third dorsal spines subequal, 2.8 in the head; fourth dorsal ray 2.2, seventh anal ray 2.1 in the head.

Head depressed broader than deep. With the exception of the snout and under surfaces, it is entirely covered with small cycloid scales. The upper surface of the head, cheeks, opercles, and mandible are traversed by numerous series of minute mucigerous papillæ, which are largely hidden among the scales; there is an open pore above the posterior nostril, and several others around the preopercular border. Eye superolateral, much shorter than the snout. Interorbital space broad, nearly flat, and completely covered with minute scales which extend forward to between the posterior nostrils. Preopercular margin entire, the angle without a spine. Snout produced, rounded anteriorly, the mandible projecting far beyond the upper jaw; the posterior processes of the premaxillaries form a protuberance on the snout, which produces a characteristic convexity of the profile anteriorly. Anterior nostril in a

tube overhanging the lip, the posterior a large opening near the upper margin of the eye with skinny edges. Mouth oblique, the maxilla reaching backward to below the posterior fourth of the eye. A broad band of villiform teeth in the premaxillaries, some of which are a little larger than the others near the symphysis, and an outer row of strong conical, but small teeth; mandible with a band of villiform teeth, the inner row of which is a little larger than the others, and an outer row of conical teeth; posteriorly these give place to an inner row of similar teeth which increases in size backwards. Tongue broadly spatulate and free anteriorly, its margin rounded. Gill-openings extending far forward below, the space separating them being narrower than the eye; exposed edge of the shoulder girdle quite smooth.

Body broader than deep anteriorly, becoming compressed posteriorly. It is completely covered with rather small ctenoid scales which are subequal in size on the sides and tail, but are smaller on the nape, breast, and pectoral base; they extend onto the bases of the pectoral and caudal fins between the rays. Genital papilla large.

First dorsal commencing before the middle of the pectoral, its margin rounded; the second and third spines are longest, and the sixth is more widely separated than the others. The second dorsal rays increase slightly in length to the penultimate, which is a little longer than the highest spine; the last is double, and reaches somewhat more than half its distance from the caudal base. Anal almost opposite the second dorsal, and of similar form; the rays increase in height to the seventh. Pectoral rounded, the tenth ray longest but not reaching the vertical of the vent. Ventrals inserted a little before the pectorals, the fourth rays longest, and reaching about two-thirds of their distance from the vent. Caudal rounded.

Colour.—Dark brown after long preservation, without definite markings.

Described from the holotype of *Eleotris immaculatus*, 480 mm. long. It proves its original description to be inaccurate in its proportional details, particularly as regards the measurements of the eye and the interorbital space.

Variation.—An example 335 mm. long, which is a cotype of *E. crescens*, De Vis, is quite similar in all its structural details to the specimen described, differing only in some slight proportional measurements which are coincident with its smaller size. Another specimen which is only 181 mm. long, is much lighter in colour, being sandy yellow with grey lines along each row of scales on the back and sides, while the dorsal and caudal fins are mottled with grey spots; it has the following proportions:—Head 2·7 in the length to the hypural joint; depth before the ventrals 5·6 in the same; breadth before the pectoral bases 0·1 greater than the depth; depth of the caudal peduncle 3·3 in the head; eye 8 in the head, and 1·8 in its distance from the premaxillary symphysis; it is 1·9 in the interorbital space, which is 4·1 in the head.

Synonymy.—Steindachner's description of *E. lineolatus* from Rockhampton agrees very well with a cotype of *E. crescens*, De Vis, from the

same locality, and the two are apparently synonymous. The example of *E. crescens* further agrees in all details with the holotype of *E. immaculatus* described above; its palate is perfectly smooth, there being no indication of palatine or vomerine teeth as described by De Vis. The type of *E. planiceps*, Macleay (1882), cannot now be found, and appears to have been lost; its brief description does not enable us to determine its identity, but it is very probably synonymous with *O. lineolatus*. Weber's description and figure of his *O. heterodon* agree very well with the holotype of *O. immaculatus*, and we consider his suggestion as to the probable identity of the two to have been proved correct.

Mr. Robert Archer of Gracemere Station, Rockhampton, informs us that this fish is never seen in the winter; but in summer it lies close to the surface and can be easily caught with a landing-net; it is very sluggish, and he has never known it to take a bait. It is the only fish in the Mere worth eating, having white firm and flaky flesh which is not at all muddy in flavour; all the other species occurring in the Mere are almost uneatable because of their muddy taste.

Locs.—We have examined six specimens from the following Queensland localities. Gracemere, and other lagoons near Rockhampton; cotypes of *E. crescens*, De Vis. Double Creek, Upper Dawson River; coll. H. Pearce. Hughenden, Flinders River; coll. F. L. Berney. The holotype of *E. immaculatus* was obtained in the Kéremma River, Gulf of Papua.

Genus ELEOTRIS, Bloch & Schneider.

Eleotris, Gronow, Zoophylaceum, 1763, p. 58 (*Gobius pisonis*, Gmelin)—Non-binomial. *Id.*, Bloch & Schneider, Syst. Ichth., 1801, p. 65—after Gronow.

Culius, Bleeker, Nat. Tijds. Ned. Ind., xi., 1856, p. 41 (*Poecilia fusca*, Bloch & Schneider).

Body cylindrical anteriorly, compressed posteriorly; scales small and mostly ctenoid, but cycloid on the nape, breast and abdomen. Head with small cycloid scales which extend forward to the posterior nostrils, and cover the cheeks and opercles; they are often hidden in mucous in well preserved specimens and are difficult to detect. Preoperculum with a spine at the angle. Snout, upper surface of the head, cheeks, opercles, and mandible with many rows of microscopic mucigerous papillæ. Snout obtuse, the mandible projecting; mouth oblique. Eye superolateral, the interorbital space wide. Nostrils widely separated, the anterior tubular. No barbles. Each jaw with a band of villiform teeth, and an outer row of stronger ones. Tongue free, slightly rounded anteriorly. Gill-openings continued a little forward below, the isthmus of moderate width; exposed edge of the shoulder-girdle smooth. Pseudobranchiæ present; anterior gill-rakers of the first arch few and thick, about eight on the lower limb. Dorsal fins short, with about vi/9 rays; anal similar to the soft dorsal. Caudal and pectorals rounded; ventrals i/5, widely separated.

This definition is based upon *E. fusca*, Bloch & Schneider.

ELEOTRIS FUSCA, Bloch & Schneider.

- Poecilia fusca*, Bloch & Schneider, Syst. Ichth., 1801, p. 453.
Cobitis pacifica, Forster, in Bloch & Schneider, *Ibid.*, and Descr. Anim. (ed. Lichtenstein), 1844, p. 235.
Cheilodipterus culius, Buchanan, Fish. Ganges, 1822, pp. 55, 367, pl. v., fig. 16.
Eleotris nigra, Quoy & Gaimard, Voy. "Uranie", Zool., 1824, p. 259, pl. lx., fig. 2. *Id.*, Cuvier & Valenciennes, Hist. Nat. Poiss., xii., 1837, p. 233.
Eleotris mauritianus, Bennett, Proc. Comm. Zool. Soc., i., 1831, p. 166.
Eleotris brachyurus, Bleeker, Verh. Batav. Gen., xxii., 1849, Blenn. en Gob., p. 20.
Eleotris melanurus, Bleeker, *Ibid.*, p. 21.
Eleotris pseudacanthopomus, Bleeker, Nat. Tijds. Nederl. Ind., iv., 1853, p. 276.
Culius niger, Bleeker, *Ibid.*, xi., 1856, p. 411.
Culius pseudacanthopomus, Bleeker, *Ibid.*
Eleotris incerta, Blyth, Journ. Asiat. Soc. Bengal, 1860, p. 146.
Eleotris fusca, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 125, and Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, Day, Fish. Malabar, 1865, p. 115. *Id.*, Kuer, Zool. "Novara," i., Fisch., pt. 2, 1865, p. 186. *Id.*, Playfair, Fish. Zanz., 1866, p. 74. *Id.*, Day, Fish. India, 1876, p. 313, pl. lxx., fig. 7. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 623. *Id.*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxii., 1898, p. 791. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 383.
Culius fuscus, Bleeker, Versl. Akad. Amst., xiv., 1862, p. 111, and Arch. Néerl. Sci. Nat., ix., 1874, p. 303. *Id.*, Bleeker, Versl. Akad. Amst. (2), xi., 1877, p. 40.
Eleotris soaresi, Playfair, Fish. Zanz., 1866, p. 74, pl. ix., fig. 4.

D. vi/9; A. 9; P. 18; V. i/5; C. 15. 62 scales between the axil and the hypural joint, and 19 between the anterior dorsal and anal rays.

Depth before the ventrals 4·3 in the length from the premaxillary symphysis to the hypural joint; head, without the mandible or the opercular lobe, 3 in the same. Eye 5·5 in the head, a little shorter than the snout, and 1·6 in the interocular space; snout 4·8 in the head. The length of the caudal peduncle is to its depth as 3 is to 2; breadth before the pectoral bases 1·08 in the depth. Third dorsal spine 2·2, and the penultimate dorsal and anal rays 1·6 in the head; pectoral 1·3, and caudal 1·1 in the head.

Head broader than deep, and covered with thick mucous which obscures the scales beneath it; these are present on the cheeks and opercles, and they extend forward to between the eyes on the upper surface of the head. The upper, lateral, and lower surfaces of the head are covered with many intersecting lines of microscopic mucigerous papillæ, which are most abundant around the eye; no enlarged open pores. Preoperculum with a stout antrorse spine at its angle. Eye rather small, superolateral;

interorbital space broad. Snout broadly rounded, its upper profile with a projection before the eyes formed by the posterior processes of the premaxillaries. Nostrils widely separated, the anterior in a low tube overhanging the upper lip, the posterior before the superoanterior angle of the eye. Mouth oblique, the maxilla extending to below the posterior portion of the eye; mandible projecting well beyond the upper jaw. Each premaxillary with a band of villiform teeth, the inner rows of which are slightly larger than the others, and an outer row of stronger conical teeth; mandibular teeth similar to those of the premaxillaries anteriorly, but the outer conical teeth are wanting posteriorly, and the inner teeth are enlarged. Tongue free anteriorly, its margin rounded. Gill-opening continued forward to below the preopercular angle, the isthmus much wider than the eye; exposed edge of the shoulder-girdle smooth, with a free dermal membrane.

Body robust, compressed, the dorsal contour a little more arched than the ventral. It is covered with rather small scales, which are mostly ctenoid and of subequal size; they are smaller and cycloid on the nape, breast and abdomen, and on the extreme dorsal and ventral surfaces. Genital papilla large and foliate.

First dorsal originating a little before the middle of the pectoral; it is rounded and low, the longest spine being shorter than its basal length, and just reaching the base of the second dorsal when adpressed. Second dorsal higher than the first, the sixth to eighth rays longest, and the margin feebly rounded. Anal almost opposite, and of similar form to the second dorsal. Pectoral rounded, the middle rays almost reaching the vertical of the anterior dorsal ray. Ventrals inserted below the anterior portion of the pectoral base, the fourth rays longest and reaching about three-fourths of their distance from the vent. Caudal rounded.

Colour.—Brown, darker above and lighter below; the sides with indistinct and interrupted series of dark lines along the rows of scales. Several indefinite dark lines radiate backward from the eye, and the upper base of the pectoral bears a dark blotch. First dorsal with a broad white border, the remainder of both fins dusky and ornamented with closely set angular brown markings; the rays of all the other fins are speckled with brown.

Described from a specimen 155 mm. long, from Samoa. It appears to be similar to many others from New Caledonia and the New Hebrides, and apparently differs in only trifling details from an Indian example.

Locs.—Northern Queensland; old collection, Queensland Museum. Oubatche, New Caledonia; coll. C. Hedley. Santo, New Hebrides. Samoa; coll. Professor Jordan, 1902. Calcutta, India; Dr. Day's collection.

ELEOTRIS OXYCEPHALUS, Temminck & Schlegel.

Eleotris oxycephalus, Temminck & Schlegel, Fauna Japonica, Poiss., 1845, p. 150, pl. lxxvii., fig. 4-5. *Id.*, Kner, Reise "Novara", Zool., i., Fische, 1865, p. 185.

Kner recorded *Eleotris oxycephalus*, Schlegel, from Sydney, but the species certainly does not occur in New South Wales. The localities recorded for many of the "Novara" fishes are known to be incorrect.

The affinities of the following seven species are unknown to us.

(ELEOTRIS) CASTELNAUI, *Macleay*.

Eleotris obscurus, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 134 (not of Schlegel).

Eleotris castelnaui, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 620
—substitute name.

Loc.—Fremantle, West Australia (Castelnau).

(ELEOTRIS) PLANICEPS, *Castelnau*.

Eleotris planiceps, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 49.

Loc.—Norman River, Gulf of Carpentaria (Castelnau).

(ELEOTRIS) PALLIDA, *Castelnau*.

Eleotris pallida, Castelnau, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 24.

Loc.—Cape York (Castelnau).

(ELEOTRIS) MELBOURNENSIS, *Sauvage*.

Eleotris (Eleotriodes) melbournensis, Sauvage, Bull. Soc. Philom. (7), iv., 1880, p. 57.

Loc.—Melbourne (Sauvage).

(ELEOTRIS) ROBUSTUS, *De Vis*.

Eleotris robustus, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 692.

Loc.—Queensland coast (De Vis).

(ELEOTRIS) SULCATICOLLIS, *Castelnau*.

Eleotris sulcaticollis, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 142.

Loc.—Brisbane River (Castelnau).

(ELEOTRIS) STRIATA, *Steindachner*.

Eleotris striata, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 452.

Apparently near *Mogurnda adspersa*, but differing, according to the description, in details of the squamation.

Loc.—Port Jackson (Steindachner).

Genus *BUTIS*, Bleeker.

Butis, Bleeker, Nat. Tijdschr. Ned. Ind., xi., 1856, p. 412 (*Eleotris butis*, Buchanan).

Body robust, compressed; head depressed, the snout produced with the mandible projecting. Scales large and angular, with one or more scalelets covering their basal portions; they are everywhere strongly ctenoid, and extend forward to the nostrils and cover the sides of the head. Naked mucigerous canals extend from the snout, around each side of the interorbital area, to the shoulder and around the preopercular border; they are defined by distinct osseous crests. Several open pores are present on the preopercular border. Mouth large, oblique; teeth in a band in each jaw, and either uniformly villiform or with the outer series enlarged. Tongue spatulate, free anteriorly. No barbles. Gill-openings extending well forward below, the isthmus narrow; exposed edge of the shoulder-girdle smooth. Pseudobranchiæ present; anterior gill-rakers of the first arch stout, about six on the lower limb. Dorsal fins short, with about vi/9 rays; anal similar to the second dorsal. Pectorals narrowly rounded, without free rays. Ventrals i/5, widely separated, the fourth rays longest. Caudal narrowly rounded.

The above definition is based on *B. butis* and *B. amboinensis*.

BUTIS AMBOINENSIS (Bleeker), Day.

(Plate xxxvi., fig. 4).

Eleotris amboinensis, Bleeker, Nat. Tijdschr. Ned. Ind., v., 1853, p. 343. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 117. *Id.*, Day, Fish. India, 1876, p. 316.

Eleotris buccata, Blyth, Journ. Asiat. Soc. Bengal, 1860, p. 145.

Butis amboinensis, Bleeker, "Eleotriiformes", 1874, p. 5—*fide* Day.

Prionobutis buccata, Bleeker, *Ibid.*,—*fide* Day.

Eleotris longicauda, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 691.

Butis longicauda, Ogilby, Proc. Roy. Soc. Qld., xxiii., 1910, p. 22.

Eleotris papa (De Vis, M. S.) Ogilby, *Ibid.*, p. 24.

Eleotris butis, Ramsay & Ogilby, Proc. Linn. Soc. N.S.Wales (2), i., 1886, p. 8 (not *E. butis*, Buchanan).

D. vi/9; A. 9; P. 17; V. i/5; C. 15. 29 scales between the axil and the hypural joint, and 11 between the anterior dorsal and anal rays.

Depth before the dorsal fin 4·7 in the length to the hypural joint; head 2·8 in the same. Eye 6·1 in the head, and 2·08 in the snout, which is 2·9 in the head. Interorbital space one-third broader than the eye, 1·3 in the snout. Depth of caudal peduncle 2·03 in its length, which is 1·3 in the head. Breadth before the pectorals slightly less than the depth.

Head depressed, much broader than deep; its upper profile slightly concave. Sharp bony ridges are present on the upper surface of the head between the nostrils, surrounding the orbits, above the opercular margins,

and around the preopercular border. Mucigerous canals covered by thin membrane follow these bony ridges, and are perforated along their length by open pores. Scales cover the cheeks and opercles, and all of the snout posterior to the hinder nostril; they are small on the anterior half of the head, larger on the opercles, and bear many minute scalelets on their basal portions. Orbit breaking the upper profile of the head, the eye small and lateral. Interorbital space flat, and scaly to the orbital margins, the scales being subdivided into three series by the bony crests. Snout depressed, somewhat sharply rounded. Nostrils about midway between the eye and the end of the snout, the anterior in a low tube. Mouth a little oblique, the maxilla extending back to about the vertical of the anterior border of the eye. Mandible projecting beyond the upper jaw. Each jaw with a band of villiform teeth, which is broadest anteriorly and narrows backwards; the posterior rows are slightly larger than the anterior ones, and there is an outer row of slightly enlarged conical teeth. Tongue free, broadly spatulate. Gill-openings very wide, extending forward to below the middle of the eye, the membranes united across the isthmus; the latter about as wide as the eye. Exposed edge of shoulder-girdle smooth.

Body subcylindrical anteriorly, compressed posteriorly. It is closely covered with large angular ctenoid scales of almost uniform size, which also cover the breast and base of the pectorals. At the base of each are two or three small scalelets. Genital papilla well developed.

First dorsal originating above the anterior third of the pectoral, rounded; the second spine is longest, about as long as the snout, and the membrane from the last does not nearly reach the second dorsal. The margin of the second dorsal is straight, the second ray longest, and the others decreasing slightly backwards. Anal originating below the third dorsal ray, and terminating behind the last; its rays increase in length backwards. Pectoral rounded, the middle rays reaching the vertical of the first dorsal ray. Ventrals inserted below the hinder half of the operculum, and reaching about two-thirds of their distance from the vent. Caudal broadly rounded.

Colour-marking.—Light brown in alcohol, variegated with darker cross-bars, disposed in about five pairs; darker lines extend along the series of scales, and scattered blackish dots are present on the head and body. A broad dark streak extends across the snout to the eye, and is continued backwards across the preoperculum. Anterior dorsal marbled with blackish-brown on a lighter ground colour, and a broad light margin. Second dorsal with oblique rows of dark dots on the rays. Anal dark, with a whitish border; some large white dark-edged ocelli between the rays. Lower portion of the caudal similar to the anal, a broad portion of the upper half and a narrow lower margin white. Ventrals variegated with brown and white, and having a broad white margin. Pectorals light coloured, with a striking quadrangular blackish blotch on a light ground colour at the base of the rays.

Described and figured from a specimen 133 mm. long. Eight others 95-153 mm. long, are similar in all details, varying only in the degree of the development of the colour-marking.

Identity and Synonymy.—We have compared these specimens with an example of *B. amboinensis* from the Andaman Islands, which was identified by Dr. Day, and find no difference between them; it must be noted, however, that Day was not certain that his specimens were correctly identified. We have examined the cotypes of *Eleotris longicauda*, De Vis, which are similar to the specimens described above.

Affinities.—*B. amboinensis* differs from *B. butis*, with an Indian specimen of which we have compared it, in having a shorter maxilla, and in having the outer row of teeth in each jaw enlarged.

Locs.—We have examined specimens from the following localities.—Brisbane River, Queensland. Strickland River, Papua. Ugi, Solomon Islands.

Genus *ASTERROPTERIX*, Rüppell.

Asterropterox, Rüppell, Atlas Reise Nordl. Afrika, Fische, 1828, p. 138 (*A. semipunctatus*, Rüppell). *Id.*, Jordan & Evermann, Bull. U.S. Fish. Comm., xxiii. i., 1905, p. 480.

Brachyeleotris, Bleeker, Versl. Akad. Amst. (2), viii., 1874. p. 374 (*Eleotris cyanostigma*, Bleeker).

Priolepis, Ehrenberg—*fide* Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 305.

ASTERROPTERIX SEMIPUNCTATUS, Rüppell.

Asterropterox semipunctatus, Rüppell, Atlas Reise Nordl. Afrika, Fische, 1828, p. 138, pl. xxxiv., fig. 4. *Id.*, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 385, pl. xxxvi., fig. 1.

Eleotris cyanostigma, Bleeker, Nat. Tijd. Ned. Ind., viii., 1855, p. 452. *Id.*, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 693. *Id.*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 753.

Eleotriodes cyanostigma, Bleeker, Nat. Tijd. Ned. Ind., xv., 1858, p. 460.

Brachyeleotris cyanostigma, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 306.

Eleotris semipunctatus, Günther, Fische Südsee, vi., 1877, p. 187, pl. cxi., fig. d.

Asterropteryx cyanostigma, Snyder, Bull. U.S. Fish. Comm., xxii., 1904, p. 536.

Asterropteryx semipunctatus, Jordan & Evermann, Bull. U.S. Fish. Comm., xxiii. i., 1905, p. 480. *Id.*, Ogilby, Mem. Qld. Mus., iii., 1915, p. 125, pl. xxix., fig. 2.

Locs.—This species has been recorded from Somerset, Cape York, by De Vis., and from Bowen by Günther.

Genus PHILYPNODON, *Bleeker*.

Philypnodon, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 301 (*Eleotris nudiceps*, Castelnau). *Id.*, Waite, Rec. Austr. Mus., v. 5, 1904, p. 284.

Gymnobotis, Bleeker, *Ibid.*, p. 304 (*Eleotris gymnocephalus*, Steindachner).

Ophiorrhinus, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 745 (*Eleotris grandiceps*, Krefft).

PHILYPNODON NUDICEPS, *Castelnau*.

Eleotris (Philypnus) nudiceps, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 126.

Philypnodon nudiceps, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 301.

Eleotris nudiceps, Sauvage, Bull. Soc. Philom. (7), iv., 1880, p. 53. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 619.

Ophiorrhinus nudiceps, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 748.

Loc.—Lower Yarra River, Victoria (Castelnau).

PHILYPNODON GRANDICEPS, *Krefft*.

Eleotris grandiceps, Krefft, Proc. Zool. Soc., 1864, p. 183. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 618.

Eleotris gymnocephalus, Steindachner, Sitzb. Akad. Wiss. Wein, liii., 1866, p. 453, pl. ii., fig. 3. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62.

Gymnobotis gymnocephalus, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 304. *Id.*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, pp. 753, 757.

Ophiorrhinus grandiceps, Ogilby, *Loc. cit.*, p. 746.

Ophiorrhinus angustifrons, Ogilby, *Loc. cit.*, xxii., 1898, p. 793.

Philypnodon grandiceps, Waite, Rec. Austr. Mus., v. 1904, p. 285, pl. xxxvi. fig. 2 (synonymy).

Hab.—New South Wales.

Genus OPHIOCARA, *Gill*.

Ophiocara, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 270 (*Eleotris ophiocephalus*, Cuvier & Valenciennes).

Body robust, compressed, the head large and broad. Scales large, mostly ctenoid on the body and cycloid on the head; there are 28-38 between the axil and the hypural joint, and they extend forward on the upper surface of the head to before the posterior nostrils, and completely cover the cheeks and opercles. Mucigerous canals of the head almost

hidden in the scales; some large open pores on the snout, interorbital space, nuchal groove, and preopercular margin. Eye of moderate size, the interorbital space broad and flat. Snout obtuse, the mandible projecting; no barbles. Each jaw with a band of villiform teeth, and an outer row of stronger ones. Tongue, broad, subtruncate, and free anteriorly. Gill-openings wide, extending well forward below, the space between them either narrow or of moderate width; exposed edge of the shoulder-girdle forming a smooth curved ridge. Pseudobranchiæ present; anterior gill-rakers of the first arch broad and short, about nine on the lower limb. Dorsal and anal fins short, with six spines and about nine rays. Pectoral and caudal rounded; ventrals $i/5$, widely separated.

Key to the Australian species.

- a. Preopercular margin hidden by the scales; supraciliary scales present.
- b. About 30 scales between the axil and the hypural joint.....*aporos*.
- aa. Preopercular margins exposed and free; no supraciliary scales.
- c. About 37 scales between the axil and the hypural joint.....*darwiniensis*.

OPHIOCARA APOROS, Bleeker.

Eleotris aporos, Bleeker, Nat. Tijds. Ned. Ind., vi., 1854, p. 59. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 109. *Id.*, Kner, Reise "Novara", Zool., i., Fisch. 2, 1865, p. 183. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 616.

Eleotris aporus, Bleeker, Nederl. Tijds. Dierk., ii., 1865, p. 293. *Id.*, Weber, Nova Guinea, v., 1907, p. 252.

Ophiocara aporus, Bleeker, Versl. Akad. Amst. (2), xi., 1877, p. 33.

? *Eleotris porocephaloides*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 384 (not of Bleeker).

Eleotris planiceps, Macleay, Proc. Linn. Soc. N.S. Wales, viii., 1883, p. 206 (not of Castelnau, 1878, nor of Macleay, 1882).

Eleotris aporocephalus, Macleay, *Ibid.*, ix., 1884, p. 33—substitute name.

Ophiocara aporos, Jordan & Seale, Bull. U.S. Fish. Bureau, xxv., 1906, p. 384. *Id.*, Jordan & Richardson, Bull. U.S. Fish. Bureau, xxvii., 1908, p. 274.

D. $vi/9$; A. 10; P. 14; V. $i/5$; C. 15. 29 rows of scales between the axil and the hypural joint, and 10 between the anterior dorsal and anal rays.

Depth before the ventrals about 5 in the length from the premaxillary symphysis to the hypural joint; head, without the mandible, $3\cdot2$ in the same. Eye $7\cdot1$ in the head, and 3 in the interocular space; it is much shorter than the snout. Breadth before the pectoral bases about equal to the depth; the depth of the caudal peduncle is to its length as 2 is to 3.

Head broader than deep, flat above, and almost entirely covered with large cycloid scales; these extend forward almost to the level of the anterior nostrils on the upper surface, and those on the nape have crenulate

margins and are larger than the body scales; there are sixteen rows in front of the first dorsal. A mucigerous canal is present above the eye, which defines a patch of supraciliary scales; two others extend across the cheek, but the remainder, including the parietal groove, are hidden beneath the scales. Preopercular margin not free, almost completely hidden by the scales; an open pore near its angle. Eye rather small, lateral, and situated within the anterior third of the head; it is close to the upper profile. Interorbital space very broad and flat. Snout broadly rounded, with a knob formed by the posterior premaxillary processes; mandible projecting, the symphysis angular. Mouth oblique, the maxilla reaching to below the anterior third of the eye. Nostrils well separated, the anterior in a low tube near the lip, the posterior a simple opening near the eye. Each jaw with a band of villiform teeth, and an outer row of stronger ones. Tongue broad, subtruncate and free anteriorly. Gill-openings extending forward almost to below the middle of the preoperculum, the space separating them wider than the eye. Exposed edge of the shoulder-girdle forming a smooth curved ridge; a sharp angle at its junction with the lower margin of the gill-opening.

Body robust, subcylindrical anteriorly, compressed posteriorly. The scales are large and mostly ctenoid, but are cycloid on the breast and base of the pectoral; they extend up between the bases of the pectoral and caudal rays. Genital papilla large and broadly rounded, with fimbriate edges.

First dorsal commencing above the hinder half of the pectoral, its margin rounded; the third spine is longest but does not reach the second dorsal when adpressed. Second dorsal somewhat rounded, the seventh ray longest, and reaching about two-thirds of its distance from the hypural joint. Anal of similar form to the second dorsal, its origin and termination a little behind those of that fin. Pectoral rounded, the median rays almost reaching the vertical of the interspace between the two dorsals. Ventrals widely separated, the fourth rays longest, and reaching about three-fourths of their distance from the vent. Caudal broadly rounded.

Colour.—Brown above, after long preservation, white below. Two dark bars extend obliquely downward from the eye to the operculum, and a third crosses the operculum to the pectoral base; this last has a light patch on its upper portion, and there is a dark bar, followed by a lighter one, at the bases of the rays. The sides of the body have indications of several longitudinal stripes. The fins are dark in colour, and the dorsals, anal, and ventrals have each a broad light margin.

Described from a specimen 284 mm. long, which is one of the cotypes of *Eleotris planiceps*, Macleay (= *E. aporocephalus*, Macleay). It clearly shows the cephalic colour-markings which were said to be wanting by Macleay, but it seems that these dark bars are sometimes more pronounced in old preserved specimens than in those which are fresher.

Identity.—We have compared this example with a specimen from the Malay Archipelago, which was received from Dr. F. Day as *O. aporos*, and find the two similar in all details.

Locs.—Eleven specimens similar to the example described are in the Australian Museum from the following localities.—Lillesmere Lagoons, Burdekin River; cotypes of *E. planiceps*. Cairns, Queensland. Gazelle Peninsula, New Britain. Solomon Islands. Fiji. Malay Archipelago. Eleven specimens are in the Queensland Museum from the Burdekin River, the Barron River, and Ingham, Queensland.

OPHIOCARA DARWINIENSIS, Macleay.

Agonostoma darwiniense, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 360, pl. ix., fig. 8.

Eleotris darwiniensis, Macleay, *Ibid.*, iv., 1879, pp. 63, 425, and v., 1881, p. 616.

† *Eleotris ophiocephalus*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 384.

Eleotris ophiocephalus, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 615.

Eleotris porocephalus, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 755.

D. vi/9; A. 8; P. 16; V. i/5; C. 15. 37 rows of scales between the axil and the hypural joint, and 14 between the anterior dorsal and anal rays.

Depth before the ventrals about 5 in the length from the premaxillary symphysis to the hypural joint; head without the mandible, 4 in the same. Eye 5·2 in the head, and 1·8 in the interorbital space; it is a little shorter than the snout. Breadth before the pectoral bases 1·1 in the depth; depth of the caudal peduncle 1·3 in its length.

Head broader than deep, flat above, and almost entirely covered with scales of moderate size; they extend forward to before the posterior nostrils on the upper surface, and some on the nape are a little larger than the body-scales; some of the scales on the upper surface of the head and cheek are cycloid, but the remainder are ctenoid; there are about twenty-one before the dorsal fin. No distinct mucigerous system above the eye, and no supraciliary scales. Several rows of microscopic mucigerous papillæ extend downward from the eye, and two others cross the cheek horizontally, while further series are present above and behind the preopercular margin, and beneath the mandible. Preopercular margin free and exposed; several large open pores are present around its border, along the parietal groove, and above the nostrils. Eye of moderate size, superolateral, but not cutting the upper profile; it is situated within the anterior half of the head. Interorbital space very broad and flat. Snout broadly rounded, its upper profile scarcely interrupted by a knob formed by the posterior processes of the premaxillaries; mandible projecting, the symphysis rounded. Mouth oblique, the maxilla reaching to below the middle of the eye. Nostrils separated, the anterior tubular and overhanging the lip, the posterior with dermal margins and near the eye. Each jaw with a band of villiform teeth, and an outer row of larger conical ones; in the mandible the outer row is wanting laterally, and is replaced with a row of enlarged inner teeth. Tongue broad, subtruncate and free anteriorly. Gill-openings extending forward to below the hinder margin of the eye,

the space separating them narrower than the eye. Exposed edge of the shoulder-girdle a smooth ridge, and forming an angle at its junction with the lower margin of the gill-opening.

Body robust, subcylindrical anteriorly, compressed posteriorly. The scales are of moderate size, and everywhere ctenoid except on the breast and base of the pectoral; they cover the bases of the pectoral rays, and extend up between those of the caudal. Genital papilla large, subquadrate, its hinder margins fimbriate.

First dorsal rounded, originating above the middle of the pectoral; the third spine is the longest, but does not reach the second dorsal when adpressed. Dorsal rays increasing in length to the penultimate, which reaches three-fourths of its distance from the hypural joint. Anal opposite, and similar in form to the second dorsal. Pectoral rounded, reaching to below the middle of the interspace between the two dorsal fins. Ventrals widely separated, their fourth rays longest and reaching more than two-thirds of their distance from the vent. Caudal broadly rounded.

Colour-marking.—Dark brown above after long preservation, light below; the sides bear dark longitudinal stripes between each row of scales, and the central portion of many of the scales is occupied by a light spot. The sides of the head likewise bear a few light spots, but are otherwise uniformly dark in colour. The membrane of the vertical fins is dark between the rays, and the second dorsal and caudal bear numerous pronounced yellowish ocelli in irregular rows; similar ocelli are indicated on the first dorsal, but they are absent from the anal. The margin of the second dorsal, and the upper and lower borders of the caudal are light coloured, while the anal is broadly margined with yellow. Ventrals dusky with lighter margins.

Described from a specimen 187 mm. long, which is one of fifteen cotypes preserved in the Macleay Museum. The others, which range from 43-190 mm. in length, exhibit but little variation in their colour-marking, though the white spots are scarcely developed in the smallest specimens.

Colour.—An example 241 mm. long, secured alive by one of us at Cooktown, presented the following colouration. Dorsal surface olive-green, closely vermiculated with dark brown; sides dark blue shot with green, most of the scales with a large greenish-white spot; under surfaces dusky grey, changing to white near the vent. Sides of the head similar to the body, but with fewer and smaller light spots; throat dusky, with large light blotches. First dorsal dusky olive, shot with blue and green. Second dorsal dusky olive below, clearer above, the rays darker; numerous bluish-white spots between the rays forming very irregular rows, and extending high up between the posterior rays; a broad orange margin between the second and seventh rays. Caudal pale blue, the rays dark olive, with numerous greenish-white spots basally; an imperfect orange margin above and below. Anal rich blue and green, the rays darker; a dark submarginal ill-defined band, and a broad orange border. Ventrals blue, the rays olive, with an imperfect yellow margin. Pectoral base without darker markings but with numerous lighter spots; the rays are dusky olive irregularly spotted with black.

Identity.—We retain the name *darwiniensis* for this species because we are unable to satisfactorily identify it with any of those described from the East Indian Archipelago. It is very similar to *O. porocephalus*, with representative examples of which we have compared it, but the light dorsal and caudal spots offer a striking contrast to the dark markings of those fins in Cuvier and Valenciennes' species.

We have examined the specimen recorded as *O. ophiocephalus* by Macleay from Rockingham Bay, and find it similar in all details to his cotypes of *O. darwiniensis*. This leads us to suppose that the specimens recorded by Klunzinger under the same name from Port Denison and Port Darwin, also belong to Macleay's species.

This species is deemed a delicacy by the Chinese at Cooktown, Queensland, where it is occasionally secured in large quantities. The fish retains its vitality for some hours after its removal from the water, which is an important factor in its keeping qualities in a hot climate.

Locs.—Port Darwin, North Australia; cotypes of the species. Melville Island, North Australia; Queensland Museum. Cooktown, Queensland; coll. McCulloch, June 1918. Rockingham Bay, Queensland; Macleay Museum, as *Eleotris ophiocephalus*.

OPHIOCARA MACROLEPIDOTA (Bloch), Günther.

Eleotris macrolepidotus, Günther, Fisch. Südsee, vi., 1877, p. 186, pl. cxii., fig. b. *Id.*, Weber, Zool. Forsch. Austr., v., 1895, p. 270. *Id.*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 754.

Eleotris tumifrons (Cuvier & Valenciennes), Ogilby, *Ibid.*, p. 755.

Günther identified North Australian specimens as *E. macrolepidotus*, while Weber recorded the species from the Burnett River, Queensland. It is possible that both references are based upon examples of one of the species described above.

Genus MOGURNDA, Gill.

Mogurnda, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 270 (*Eleotris mogurnda*, Richardson). *Id.*, Bleeker, Arch. Néerl. Sci. Nat., ix., 1874, p. 303, and x., 1875, pp. 103, 105.

Krefftius, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 736 (*Eleotris australis*, Krefft). *Id.*, Waite, Rec. Aust. Mus., v., 1904, p. 281—part.

Body rather robust, compressed, the head large and broad. Scales rather large, mostly otenoid on the body and cycloid on the head; 30-40 between the pectoral and the hypural joint; they extend forward on the upper surface of the head to between the posterior nostrils, and cover the cheek and operculum. Rows of minute pores extend around the eye, across the cheek, behind the preoperculum and on each side of the mandible. Mouth moderate, oblique, lower jaw projecting; no barbles. A band of villiform teeth in each jaw, palate toothless. Tongue broad,

rounded anteriorly and largely free. Gill-openings separated by a wide isthmus, the membranes extending forward, but not united across it. Exposed edge of the shoulder-girdle forming a smooth, curved ridge. Pseudobranchiæ present; gill-rakers of first gill-arch short and spaced, about eight on the lower limb. Dorsal with 7-9 spines, and 9-14 rays, anal with 9-14 rays. Ventrals separate, with $i/5$ rays. Caudal rounded.

Affinities.—This genus is very similar to *Ophiocara*, Gill, from which it differs principally in its physiognomy. The squamation of the upper surface of the head is very different in typical forms of the two genera, while the first dorsal has usually six spines in *Ophiocara* and seven to nine in *Mogurnda*, but some species exhibit intermediate characters between these extremes. *Odontobutis*, Bleeker, is also closely allied to *Mogurnda*, but has only a narrow isthmus separating the gill-openings, over which the membranes are narrowly united.

Key to species.—

- a. Dorsal with 11-18 rays, body spotted. Vertebrae 31.....Subgenus *Mogurnda*.
- b. 37-42 scales between the axil and the hypural joint.....subspecies *mogurnda*.
- bb. 30-35 scales between the axil and the hypural joint.....subspecies *adspersus*.
- aa. Dorsal with 9 rays, body striped. Vertebrae 28.....Subgenus *Krefflius*.
- c. 31-33 scales between the axil and the hypural joint.....*australis*.

MOGURNDA MOGURNDA, Richardson.

Eleotris mogurnda, Richardson, Ichth. "Erebus & Terror", 1844, p. 4, pl. ii., fig. 1-2. *Id.*, Günther, Brit. Mus. Cat. Fish., iii., 1861, p. 111. *Id.*, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 85, and Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 23. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 384. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 617.

Eleotris mogurnda, Weber, Nova Guinea, v., 1903, p. 253, and Abhandl. Senckenb. Naturforsch. Gesellsch., xxxiv., 1911, p. 34, pl. i., fig. 2.

Eleotris larapinta, Zeitz, Rept. Horn Sci. Exp. C. Aust., ii., 1896, p. 179, pl. xvi., fig. 4.

D. viii/13; A. 12; P. 16; V. $i/5$; C. 15. 41-42 rows of scales between the axil and the hypural joint, and 16 between the anterior dorsal and anal rays.

Depth at ventrals 3.5 in the length between the premaxillary symphysis and the hypural joint; head 3.2 in the same. Eye 5 in the head, shorter than the snout, which is 4.2 in the head; interocular width almost twice as wide as the eye, 2.7 in the head. Breadth between the bases of the pectorals 1.4 in the depth; depth of caudal peduncle 2 in the head. Sixth dorsal spine 2.7, last dorsal ray 1.5, and last anal ray 2.1 in the head. Pectoral 1.7, caudal 1.3 in the head.

Head largely covered with cycloid scales, which extend forward to between the posterior nostrils above, and cover the cheek and operculum; snout and mandible naked. Rows of minute pores extend from above the

nostrils, over and behind the eye, to the groove above the opercles; others cross the cheek and operculum, and extend around the preopercular margin and onto the mandible; no large open pores. Eyes separated by a broad, flat, interorbital space; some small imperfect scales on the upper part of the eye. Snout broadly rounded, the mandible projecting. Mouth oblique, the maxilla reaching to below the anterior third of the eye. Anterior nostril in a short tube near the lip, the posterior a simple opening on the upper surface of the head. A broad band of villiform teeth in each jaw, palate toothless. Tongue rounded anteriorly, and largely free. Gill-openings lateral, and continued somewhat forward below, the isthmus separating them wider than the eye. Exposed edge of the shoulder-girdle smooth.

Body robust, compressed posteriorly, covered with ctenoid scales, which extend over the breast and bases of the pectorals. They are a little larger posteriorly than anteriorly. Genital papilla well developed.

First dorsal fin rather low, rounded, and commencing well behind the pectoral base; the penultimate spine is longest, and reaches beyond the first ray when adpressed. Second dorsal oblong, pointed posteriorly, the margin straight; the penultimate ray is longest, and reaches the vertical of the hypural joint. Anal opposite the second dorsal, and similar in form though a little more rounded anteriorly. Pectoral rounded, the median rays longest, and almost reaching the vertical of the last dorsal spine. Ventral inserted below the pectoral-base, the fourth ray longest, and reaching about two-thirds of its distance from the vent. Caudal broadly rounded.

Colour-marking.—Light brown in alcohol, with numerous darker spots along the middle of the sides, which coalesce posteriorly into two longitudinal lines enclosing large darker and lighter blotches. Two oblique stripes cross the cheek from the eye, and are continued across the operculum; a third crosses the operculum and the base of the pectoral to a dark blotch on the bases of the rays. First dorsal dusky, with some obscure darker spots, and a white border. Second dorsal dusky, with a white border and numerous large darker spots near the base and on the posterior rays, where they mingle with some lighter markings. Anal with markings similar to those of the second dorsal. Caudal with dark spots between the rays on its median portion, which are largest near the base.

Described from an adult specimen 120 mm. long, from Port Essington, which is somewhat faded, but exhibits all the characters of the species.

Identity.—This specimen, and the others referred to below, differ from Richardson's description of *E. moguruda*, also from Port Essington, in having fewer rays in the dorsal and anal fins, but it must be noted that Günther later re-examined the types and found them constructed as in our specimens. Günther counted forty-eight scales in a longitudinal series, which is a larger number than we find in any of ours.

Variation.—Three specimens, also from Port Essington, 25-42 mm. long without the caudal fin, exhibit some variation in the number of fin-rays and scales; D. viii-ix/12-13; A. 12; 38-40 scales between the

axil and the hypural joint, and 15-16 between the anterior dorsal and anal rays. In other specimens the number of anal rays varies from 11-14.

Synonymy.—Three examples, 45-63 mm. long, from Red Bank Creek, Central Australia, and received for examination from the South Australian Museum, are topotypes, and possibly cotypes of *Eleotris larapinta*, Zietz. They differ from the description of that species in having the maxilla extending to or beyond the anterior ocular margin instead of nearly to it as described, and the eye is more instead of less than half the interocular width; D. viii/12; A. 11-12; 38-39 scales between the axil and the hypural joint. Others from the Finke River, Central Australia, are similar, and have D. viii-ix/13; A. 11-12; 40 scales between the axil and the hypural joint. These specimens are quite similar to the larger example described above as *M. mogurnda*.

The specimen beautifully figured in colour by Weber from the Arn Islands is very probably correctly identified as *M. mogurnda*, but his illustration shows sixteen dorsal rays, which is more than we find in any of our examples.

Localities.—We have examined nineteen specimens from the following localities, Port Essington, Port Darwin, Catherine Mines and Yam Creek in the Northern Territory. Euraka Creek, Walsh River, Northern Queensland. Red Bank Creek and the Finke River, Central Australia.

Distribution.—North and Central Australia. ? Arn Islands, and the western and southern coasts of New Guinea (Weber).

MOGURNDA MOGURNDA, Richardson.

Subspecies ADSPERSUS, Castelnau.

Eleotris adpersus, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 142. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 622.

Id., Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 752.

Eleotris nimus, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 690.

Id., Ogilby, *Loc. cit.*, p. 754.

Eleotris concolor, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 692.

Krefftitus adpersus, Ogilby, *Loc. cit.*, xxii., 1898, p. 789. *Id.*, Waite, Rec.

Austr. Mus., v., 1904, p. 282, pl. xxv., fig. 1. *Id.*, Ogilby, Proc. Roy. Soc. Qld., xxi., 1908, p. 98.

Eleotris mogurnda, Bleeker, Nederl. Tijdschr. Dierk., ii., 1865, p. 71. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 326. *Id.*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1879, p. 353. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 36 (part). (Not *E. mogurnda*, Rich.)

Mogurnda mogurnda, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 757. *Id.*, Waite, Rec. Austr. Mus., v., 1904, p. 282, and Mem. N.S. Wales Nat. Club, ii., 1904, p. 45.

D. vi-ix/11-14; A. 11-14; P. 15-16; V. i/5; C. 15. 30-35 scales between the axil and the hypural joint, and 12-14 between the anterior dorsal and anal rays.

Proportions of a specimen 112 mm. long, from Bundaberg, Queensland, figured by Waite (*Loc. cit.*). Depth at ventrals 3·9 in the length between the premaxillary symphysis and the hypural joint; head 3·1 in the same. Eye 5·6 in the head, shorter than the snout, which is 4·6 in the head; interocular space twice as wide as the eye, 2·8 in the head. Breadth between the bases of the pectorals 1·3 in the depth; depth of caudal peduncle 2·1 in the head. Sixth dorsal spine 3·1, last dorsal ray 1·4, last anal ray 1·6 in the head. Pectoral 1·4, caudal 1·1 in the head.

This specimen agrees with the foregoing description of *M. mogurnda* in all details, except in having the dorsal spines somewhat shorter, and the rays of the pectoral and ventral fins longer, which are merely individual peculiarities.

The subspecies *M. m. adspersus* differs from the typical form only in having larger and less numerous scales, there being 30-35 in a longitudinal series instead of 38-42, and 13-14 in a transverse row instead of 15-16; the two are similar in all other details. But we have examined several specimens from Powell's Creek and the Palmer River, Central Australia, and inland from Cairns, Queensland, in which the scales number 35-36 in a longitudinal series, and 14-16 transversely. These localities are somewhat intermediate between the ranges of the two subspecies, so we are led to the conclusion that the larger and smaller scaled forms are merely geographical races of the one species.

Synonymy.—Five cotypes of *Eleotris minimus*, De Vis, preserved in the Australian Museum, prove this species to be synonymous with *M. m. adspersus*, as has already been determined by Ogilby. The holotype of *Eleotris concolor*, De Vis, is in the collection of the Queensland Museum; it is stuffed and its fins are much damaged, while it retains no traces of its colour-marking; its remaining characters, however, leave no doubt as to its identity with *M. m. adspersus*.

Locs.—We have examined a representative series of 86 specimens from the following localities. South Australia:—Torrens River; Onkaparinga; Murray Bridge. New South Wales:—near Mudgee and Dubbo; Clarence River. Queensland:—Brisbane River (cotypes of *E. minimus*, De Vis.); Eidsvold, Burnett River; Bundaberg; 25 miles inland from Cairns.

Distribution.—South Australia. Murray River System. Rivers of north eastern New South Wales and eastern Queensland, northward to Cairns.

MOGURNDA (KREFFTIUS) AUSTRALIS, Krefft.

Eleotris australis, Krefft, Proc. Zool. Soc., 1864, p. 183. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 61. *Id.*, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1879, p. 384. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 617.

Krefftius australis, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 737. *Id.*, Waite, Rec. Austr. Mus., v., 1904, p. 283, pl. xxxv., fig. 2.

Hab.—Eastern rivers of New South Wales.

Genus Gobiomorphus, Gill.

Gobiomorphus, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 270 (*Eleotris gobioides*, Cuvier & Valenciennes).

Mulgoa, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 740 (*Eleotris coxii*, Krefft).

Body subcylindrical anteriorly, compressed posteriorly; caudal peduncle about half as long as broad. Scales of moderate size, mostly ctenoid but becoming cycloid anteriorly and on the abdomen; they extend forward to between the posterior orbital margins. Head about as broad as deep, snout obtusely conical; mandible projecting. Operculum covered with small scales; cheeks with somewhat rudimentary scales which are most plentiful on the postorbital portions. Lines of minute mucigerous papillæ extend across the cheeks and opercles, around the preopercular margin, and from each side of the snout to above the eye. A broad band of villiform teeth in each jaw; no enlarged outer row. Tongue free and rounded anteriorly. Gill-openings extending forward below, separated by a rather broad isthmus; exposed edge of the shoulder-girdle forming a smooth ridge, with a pit at its lower angle. Pseudobranchiæ present; gill-rakers short and thick, about nine on the lower limb of the first arch. First dorsal rounded, with six to seven spines; second dorsal short, with nine to eleven rays. Pectoral and caudal rounded. Ventrals i/5, completely separated.

Synonymy.—A comparison of the genotypes *G. gobioides* and *M. coxii* shows that they are similar in all the above characters. Waite²⁰ has united *Mulgoa* with *Kreftius*, but it is distinguished from that genus in having the interorbital space naked instead of scaly.

Jordan and Evermann²¹ have united their genus *Quisquilius* with *Gobiomorphus*, but it differs in the character of its dentition. It has an enlarged outer row of teeth in each jaw, and there is a subcaniniform tooth on each side of the mandible; in *Gobiomorphus* the teeth are subequal in size.

Hab.—Fresh waters and estuaries of New Zealand and New South Wales.

Gobiomorphus coxii, Krefft.

Eleotris coxii, Krefft, Proc. Zool. Soc., 1864, p. 183. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 618.

Eleotris richardsonii, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 455, pl. ii., fig. 4.

Eleotris mastersii, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 622.

Mulgoa coxii, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 741.

Kreftius coxii, Waite, Rec. Austr. Mus., v.5, 1904, p. 283, pl. xxxvi., fig. 1.

²⁰ Waite—Rec. Austr. Mus., v. 5, 1904, p. 281.

²¹ Jordan & Evermann—Bull. U. S. Fish. Comm., xxiii. i., 1905, p. 483.

Hab.—Eastern rivers of southern New South Wales.

Gobiomorphus gobioides, Cuvier & Valenciennes, has been wrongly recorded from Port Jackson by Steindachner²², who probably had specimens of the foregoing species before him. *G. gobioides* is confined to New Zealand rivers and estuaries.

Genus CARASSIOPS, Ogilby.

Carassiops, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 732 (*Eleotris compressus*, Krefft).

Austrogobio, Ogilby, *Loc. cit.*, xxii., 1898, p. 785 (*Carassiops galii*, Ogilby).

Body compressed, deep or rather slender; head small, compressed. Scales large, ctenoid, about 28-35 between the base of the pectoral and the hypural joint; they extend forward to between the hinder margins of the eyes, but leave the interorbital space naked, and cover the cheek and operculum. Rows of minute pores extend around the eye, across the cheek, behind the preoperculum, and on each side of the mandible. Mouth rather small, oblique, lower jaw longest; no barbles. A band of villiform teeth in each jaw, palate toothless. Tongue broad, subtruncate or rounded anteriorly, and largely free. Gill-openings separated by a rather narrow isthmus, the membranes not united across it. Exposed edge of shoulder girdle a smooth, curved ridge. Pseudobranchiæ present; about eleven gill-rakers on the lower limb of the first arch, which are stout and longer posteriorly, becoming tubercular anteriorly. D. v-viii/10-13; A. 10-14; V. i/5. Caudal rounded.

Affinities.—This genus is scarcely distinct from *Hypseleotris*, Gill, apparently differing principally in having the interorbital space and snout naked instead of scaly.

- a. Second dorsal with 9-10 rays; vertebræ 24-25.....Subgenus *Carassiops*.
- b. D. vi-vii/9-10, A. 10-11; sc. long. 27-29.....*compressus*.
- aa. Second dorsal with 11-14 rays; vertebræ 30-31.....Subgenus *Austrogobio*.
- c. Medio-lateral series of scales without dark markings.....*galii*.
- cc. Each medio-lateral scale with a dark vertical basal bar.....*klunzingeri*.

CARASSIOPS COMPRESSUS, Krefft.

Eleotris compressus, Krefft, Proc. Zool. Soc., 1864, p. 184. *Id.*, Günther, Ann. Mag. Nat. Hist. (3), xx., 1867, p. 62. *Id.*, O'Shaughnessy, Ann. Mag. Nat. Hist. (4), xv., 1875, p. 147. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 619. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 36.

Eleotris brevirostris, Steindachner, Sitzb. Akad. Wiss. Wien, lvi., 1867, p. 314.

Eleotris compressus, Macleay, Proc. Linn. Soc. N.S.Wales, ii., 1878, p. 358, pl. ix., fig. 7.

²² Steindachner—Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 326.

Eleotris reticulatus, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 388, pl. iv., fig. 3. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ix, 1884, p. 33.

Eleotris elevata, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 622; (substitute name for *E. compressus*, Macleay, *nec.* Krefft).

Eleotris humilis, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 690.

Eleotris cavifrons, De Vis, *Ibid.*, p. 693 (not *E. cavifrons*, Blyth).

Eleotris devisi, Ogilby, Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 753; (substitute name for *E. cavifrons*, de Vis, *nec.* Blyth).

Carassiops compressus, Ogilby, *Ibid.*, p. 735. *Id.*, Waite, Rec. Austr. Mus., v., 1904, p. 280, pl. xxxiv., fig. 1.

Carassiops longi, Ogilby, *Ibid.*, p. 733.

Carassiops compressus montanum, Ogilby, Proc. Roy. Soc. Qld., xx., 1907, p. 28.

Hypseleotris compressus, Cockerell, Mem. Qld. Mus., ii, 1913, p. 59.

D. vi/10; A. 11; P. 15; V. i/5; C. 15. Twenty-eight scales between the upper base of the pectoral and the hypural joint, and nine between the anterior dorsal and anal rays.

Depth at ventrals 3.2 in the length to the hypural joint; head 3.6 in the same. Eye 4.2 in the head, and 1.3 in the interorbital space; snout 1.2 in the eye. Fourth dorsal spine 1.7, penultimate dorsal ray 1.1, and penultimate anal ray 1.4 in the head. Breadth at bases of pectorals 1.9 in the depth. Depth of the caudal peduncle 1.7 in the distance between the last dorsal ray and the hypural joint, and 1.8 in the head.

Cheek and operculum covered with large scales, which are arranged in about four rows on the cheeks. Rows of minute pores surround the eyes, and extend across the cheeks and opercles, around the preopercular border, and on each side of the mandible. Interorbital space naked, almost flat. Anterior nostril in a short tube near the lip, the posterior a simple opening near the upper margin of the eye. Mouth oblique, the maxilla not nearly reaching the vertical of the anterior ocular margin; mandible projecting. A broad band of villiform teeth in each jaw, palate toothless. Tongue apparently truncate anteriorly, or slightly emarginate. Gill-openings broad, separated by a rather narrow interspace. Exposed edge of shoulder girdle forming a curved, smooth ridge.

Body compressed, elevated, and covered with large ctenoid scales, which extend forward to the level of the eyes, there being about fifteen rows before the first dorsal; they are largest on the middle of the sides, and smallest on the breast and base of the pectoral. A large genital papilla, which is broad and truncate posteriorly with its lateral angles slightly produced.

First dorsal spine inserted above the end of the first third of the pectorals; the spines increase in length to the fourth, and the dorsal rays increase in length to the penultimate, which extends three-fourths of its distance from the hypural. Anal opposite and similar to the second dorsal. Pectoral rounded, not quite reaching the vertical of the first dorsal ray. Ventrals inserted below the base of the pectorals; the fourth ray longest, filamentous, and reaching the ventral. Caudal damaged.

Colour-marking.—Body completely bleached after long preservation in alcohol. The spines of the first dorsal dark towards the tip; second dorsal with some large light spots near the base and on the posterior rays. Caudal with some obscure darker spots. For details of the colour-marking of fresh specimens, see Ogilby²³ and Waite²⁴.

Described from a specimen 87 mm. long, from the Clarence River, which is believed to be one of Krefft's typical specimens. Its history is incomplete, but it tallies with the original description.

Sexual dimorphism.—Two examples in the Macleay Museum from the Tweed River, 66-67 mm. long, exhibit sexual dimorphism similar to that which we have described and figured under *C. klunzingeri*. In the larger example the space between the snout and the dorsal fin is greatly swollen, the profile forming a very convex curve; in the smaller specimen these parts are normal. They agree in all other details of both form and colour-marking, and are clearly identical with *C. compressus*.

Variation.—Nineteen specimens from several localities, indicate that this species varies considerably both in its general form and colour-marking. Adults of about the same size from Jervis Bay and Port Darwin have the depth at the ventrals 4.6 (*C. lougi*) and 3.3 (*C. elevatus*) respectively, but others are more or less intermediate between these extremes. The number of fin rays and spines, and the scales, vary as follows: D. vi-vii/9-10; A. 10-12; Sc. long. 27-30; Sc. tr. 9. The striking colour-marking of the vertical fins as described and figured by Ogilby and Waite is characteristic of adult specimens in breeding condition, and it is apparently more or less developed in all fresh examples, but may be indistinct in specimens in alcohol. Variation similar to the foregoing was noted by Günther in 1867.

Synonymy.—The variation in form of this species has caused several authors to bestow a number of names upon it.

The identity of *Eleotris brevirostris*, Steindachner, and *C. compressus*, Krefft, was recognised by O'Shaughnessy in 1875.

Though differing from its description in several important details, the specimen in the Macleay Museum labelled as *Eleotris elevatus* from Port Darwin, is evidently that on which Macleay founded the species. It agrees well with his crude figure, and is structurally similar to *C. compressus*, and exhibits traces of the characteristic markings of that species. It has the following characters. D. vi/8?, both fins imperfect; A. 10; twenty-eight rows of scales between the upper base of the pectoral and the hypural joint, and nine between the anterior dorsal and anal rays. Depth at ventrals 3.3 in the length to the hypural joint, head 3.5 in the same. Eye equal to the length of the snout, 4.6 in the head, and 1.6 in the interocular space.

Eleotris reticulatus, Klunzinger, also from Port Darwin, is evidently based on a rather slender, and imperfectly marked example of *C. compressus*.

²³ Ogilby—Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 733.

²⁴ Waite—Rec. Austr. Mus., v., 1904, p. 280, pl. xxxiv., fig. 1.

Three cotypes of *Eleotris humilis*, De Vis, 61-93 mm. long, are, as already noted by Waite, similar to the narrow form of *C. compressus*. D. vi/10-11; A. 11; Sc. longt. 28-29; Sc. tr. 9. Depth 3·8-4 in the length to the hypural joint, and subequal to the length of the head.

As noted by Waite, there is nothing in the description of *Eleotris cavifrons*, De Vis (*nec*. Blyth) to distinguish it from *C. compressus*. The substitute name *E. devisi*, Ogilby, is therefore unnecessary.

Carassiops longi, Ogilby, is, as recognised by Waite, an elongate variety of *C. compressus*; that its slender form is not of even subspecific value is proved by the fact that some specimens secured in the same locality as the types, are as broad as those from more northern localities.

The name *C. compressus montunus*, Ogilby, was proposed for slender specimens from Killarney, Queensland, which were similar to the typical form in all structural details.

Locs.—We have examined specimens from the following localities.—Clarence River, New South Wales; cotype of *Eleotris compressus*, Krefft? Tweed River, New South Wales; Macleay Museum. Liverpool and Marrickville, near Sydney. Jervis Bay, New South Wales; specimen figured by Waite. Brisbane River, Queensland; cotypes of *E. humilis*, De Vis. Mary River, Queensland. Port Darwin, North Australia; holotype of *E. elevatus*, Macleay.

Distribution.—Eastern waters of Australia from Cape York to Jervis Bay. Headwaters of the Condamine River, Queensland. Port Darwin.

The following species are probably related to, and possibly identical with *C. compressus*.

Eleotris modesta, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 85. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 620.

D. vi/9; A. 10; P. 17; V. i/5; C. 15. Sc. long. 31; sc. tr. 11. Depth a little more than 4 in the length without the caudal, head $3\frac{1}{2}$ in the same. Eye $3\frac{1}{2}$ in the head, longer than the snout. Breadth of the snout before the eyes equal to the distance between its extremity and the first third of the eye.

Snout rather depressed, not broad. Mouth oblique, the maxilla not reaching the vertical of the anterior ocular margin. Head entirely scaly; body scales large, ctenoid and striated. Dorsal spines somewhat filamentous. Ventrals long, inserted below the pectorals. Pectorals not longer than the ventrals.

General colour light yellow, brownish above. A small dark shoulder spot, and a faint dark line along the side to the tail. Some irregular oblique transverse spots on the dorsal fins, the extremity of the second black. Caudal transversely speckled with brown.

Length.—Two inches.

This species apparently resembles *E. reticulatus*, Klunzinger, from the same locality, which we regard as synonymous with *C. compressus*.

Loc.—Port Darwin.

Eleotris simplex, Castelnau, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 49.
Id., Macleay, *Ibid.*, v., 1881, p. 621.

D. vi/11; A. 11. Sc. longt. 28. Depth 4 in the length without the caudal, and equal to the length of the head. Eye longer than the snout.

Snout short, depressed, flat above. Mouth oblique, maxilla not reaching the vertical of the anterior ocular margin. Head, excepting the snout, scaly; body scales large, ctenoid, and striated. Posterior dorsal rays produced, extending beyond the base of the caudal. Anal similar to the second dorsal. Caudal pointed.

General colour yellow, the dorsal, anal and caudal fins marbled with brown.

Length.—Three inches.

All the characters noted in Castelnau's description of this species, with the exception of that relating to the posterior dorsal rays, agree with those of *C. compressus*.

Loc.—Norman River, Queensland.

CARASSIOPS (AUSTROGOBIO) GALII, Ogilby.

Carassiops (Austrogobio) galii, Ogilby, Proc. Linn. Soc. N.S.Wales, xxii. 4, 1898, p. 788.

Carassiops galii, Waite, Rec. Austr. Mus., v., 1904, p. 281, pl. xxxiv., fig. 2.

Austrogobio galii, Ogilby, Proc. Roy. Soc. Qld., xx., 1907, p. 29.

This species has been described in detail by Ogilby, and figured by Waite. It is very similar to some varieties of *C. klunzingeri*; the predorsal scales, however, are usually larger and regular, and the dark markings on the mediolateral scales, characteristic of *C. klunzingeri*, are either indistinct or wanting.

Locs.—*C. galii* is common in south-eastern Queensland, and we have examined numerous specimens from near Brisbane. Others are in the Australian Museum from Bundaberg, Queensland. The species has been introduced into a pond in the Botanic Gardens, Sydney, whence the specimens described and figured by Ogilby and Waite were obtained.

CARASSIOPS (AUSTROGOBIO) KLUNZINGERI, Ogilby.

(Plate xxxvii.; figs. 2-3.)

Eleotris cyprinoides, Klunzinger, Arch. Naturg., xxxviii. i., 1872, p. 31, and Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 384, pl. v., fig. 2.
Id., Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 33. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 29. *Id.*, Weber, Zool. Forsch. Austr., v., 1895, p. 270 (not *E. cyprinoides*, Cuv. & Val.).

(*Carassiops*) *klunzingeri*, Ogilby, Proc. Linn. Soc. N.S.Wales, xxii., 1898, p. 787 (not *Eleotris klunzingerii*, Pfeffer).

D. vii-viii/11-13 (12-14); A. 11-14 (12-15); P. 15; V. i/5-6; C. 15. 32-35 scales from above the pectoral base to the hypural joint, and 11 between the anterior dorsal and anal rays.

Depth at ventral fins 3·8-4·3 in the length to the hypural joint; head 3·4-3·6 in the same. Eye 3·4-3·8 in the head, subequal to or slightly narrower than the interocular space. Snout 1·1-1·2 in the eye. Depth of the caudal peduncle 2·7 in the head; its length from the last dorsal ray to the hypural joint is slightly shorter than the head in the male, and a little longer than it in the female.

Cheeks with rudimentary scales, operculum scaly. Numerous rows of minute pores are present on the cheek, operculum and snout, and surrounding the eye, preoperculum and mandible; no larger pores. Eye of moderate size, a little longer than the snout. Nostrils large, simple openings, the anterior near the lip, the posterior near the orbital margin. Teeth microscopic, villiform, in a band in each jaw. Tongue rounded anteriorly. Gill-openings wide, the space between the membranes about as wide as the eye. Inner margin of the shoulder-girdle smooth.

Body moderately compressed, covered with ctenoid scales, which extend forward to behind the eye, onto the base of the pectoral fin, and the thorax; they are small and irregular on the nape, but become larger backwards. Genital papilla large in both sexes. Vertebrae 31, including the hypural.

First dorsal originating well behind the pectorals and ventrals; its spines are low, and its margin rounded. Second dorsal higher than the first, pointed posteriorly in the male, rounded in the female. Anal similar to the second dorsal. Pectoral rounded, not reaching the vertical of the vent. Ventral inserted just behind the pectoral, pointed, the penultimate ray longest, not reaching the vent. Caudal rounded.

Colour-marking.—General colour greenish brown in formaline, the scales of the back and sides with darker margins. A characteristic row of dark vertical bars at the base of each scale along the middle of the side, and a blackish axillary spot. Head dusky with microscopic dots. Dorsal and anal fins dusky in the male with white margins and a darker submarginal stripe; caudal dusky, ventrals and pectorals transparent. The fins of the female may be similar to those of the male or quite transparent.

Described from twelve specimens 29-56 mm. long, including six males and six females, which were captured together in the Cudgong River at Ryleston by Mr. D. G. Stead, 18th December, 1911. They exhibit remarkable *Sexual Dimorphism* which is figured on Plate xxxvii. The adult male has the nape, occiput, and interorbital area greatly swollen, the upper profile of the head being so elevated that the eye is far removed from it; the posterior rays of the dorsal and anal fins are longer than those preceding them, and the caudal peduncle is shorter than in the female. The eye of the female is close to the profile of the head, the interorbital space being only slightly convex; the dorsal and anal fins are rounded, the third or fourth rays being longest, and the caudal peduncle is long and slender.

Variation.—Several series of specimens from various localities between Narrandera, on the Murrumbidgee River, New South Wales, and Eidsvold, on the Burnett River, Queensland, prove that this species varies considerably in the number of spines and rays in the dorsal and anal fins, and in its scale counts. But the fact that some examples from the two

extreme localities agree in these characters, while others differ, proves that these are merely individual variations, and not subspecific characters. This variation, as exemplified by thirty-three specimens is shown in the following table.

Locality.	No. of specimens.	Dorsal.	Anal.	Scales longt.	Scales trans.
Ryleston, N.S.W.	1	8/12 (13)	14 (15)	33	11
Eidsvold, Qld.	1	8/12 (13)	13 (14)	35	11
" "	1	8/12 (13)	12 (13)	35	11
Ryleston, N.S.W.	1	8/12 (13)	11 (12)	—	—
Eidsvold, Qld.	1	8/11 (12)	13 (14)	35	11
Ryleston, N.S.W.	1	7/13 (14)	13 (14)	33	11
" "	1	7/13 (14)	12 (13)	32	11
" "	1	7/12 (13)	13 (14)	32	11
" "	1	7/12	13 (14)	33	11
" "	2	7/12 (13)	12 (13)	33	—
" "	1	7/12	12 (13)	32	11
" "	1	7/13	13	—	—
" "	1	7/13	14	—	—
" "	1	7/11 (12)	12 (13)	—	—
Eidsvold, Qld.	1	7/12	12	30	9
" "	1	7/12 (13)	—	—	—
" "	1	6/12 (13)	11	30	9
" "	1	6/12	12	30	9
" "	1	6/11 (12)	11 (12)	32	10
" "	1	6/11 (12)	11 (12)	29	9
" "	1	6/11 (12)	12 (13)	—	—
" "	1	6/11	11 (12)	29	9
" "	5	6/11	11	30	9
" "	1	6/11	11	30	10
" "	1	6/11	11	31	10
" "	1	6/11	11	29	9
" "	1	6/11	11	28	9
" "	1	5/11	11	30	9

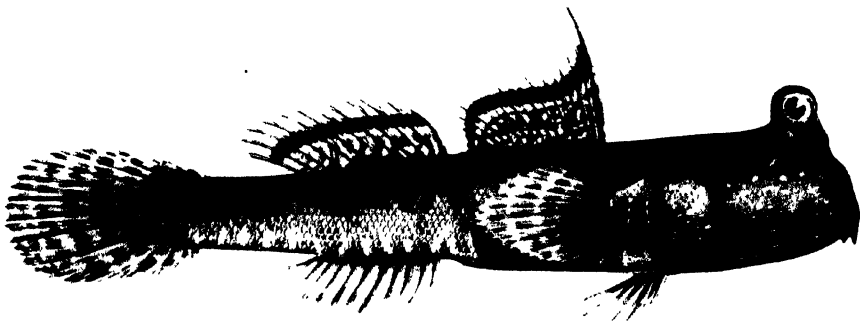
The scales on the nape are very large and regular in most of the Queensland specimens, while they are usually small and irregular in those from southern localities; but we have examples in which they are of intermediate size from both the northern and southern parts of their range, and a few from Eidsvold in which they are quite as small as those from Narrandera.

Nomenclature.—If it be considered that the name *C. klunzingeri*, Ogilby, 1898, is preoccupied by *Eleotris klunzingerii*, Pfeffer, 1893, it will be necessary to propose a new name for this species. Since the two do not enter the same genus, however, there appears to be no necessity for this course.

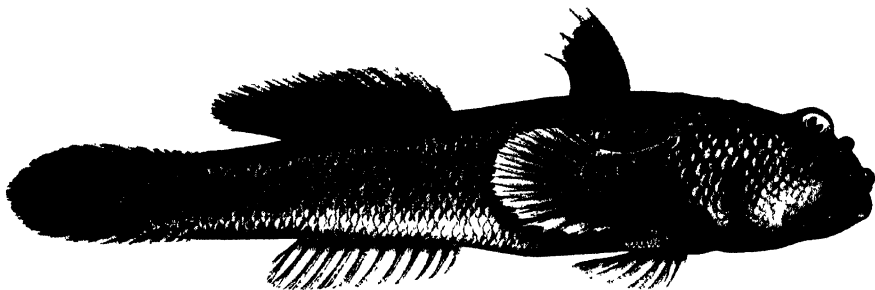
Locs.—North Yanko, near Narrandera, Murrumbidgee River, New South Wales; coll. David G. Stead, Jan. 1910. Ryleston, Cudgegong River, New South Wales; coll. David G. Stead, Dec. 1911. Pallal, Horton River, New South Wales; coll. A. R. McCulloch. Eidsvold, Burnett River, Queensland; coll. Dr. Thomas R. Bancroft.

EXPLANATION OF PLATE XXXI.

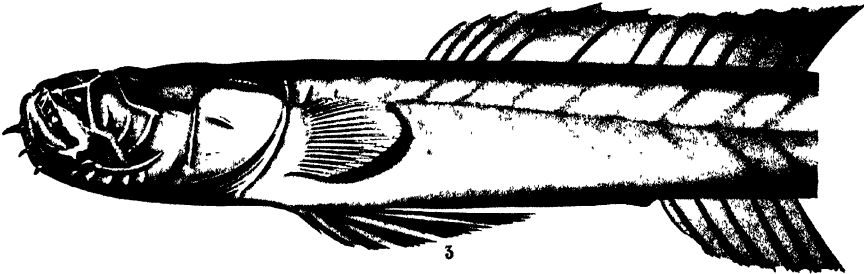
- Fig. 1. *Periophthalmus koelreuteri*, Pallas, var. *argentineatus*, Cuvier and Valenciennes. A specimen 90 mm. long, from Sunday Island, King Sound, North-western Australia.
- „ 2. *Periophthalmodon barbarus*, Linné. A specimen 197 mm. long, from Cooktown, Queensland.
- „ 3. *Leme purpurascens*, De Vis. Anterior portion of a specimen 92 mm. long, from an unknown locality.
- „ 4. *Leme mordax*, De Vis. Outline of a specimen 218 mm. long, from Ripple Creek, Herbert River, Queensland.



1



2



3



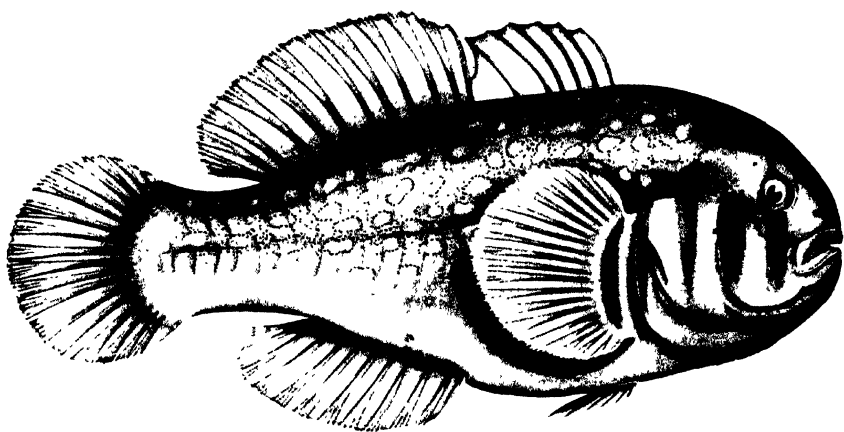
4

EXPLANATION OF PLATE XXXII.

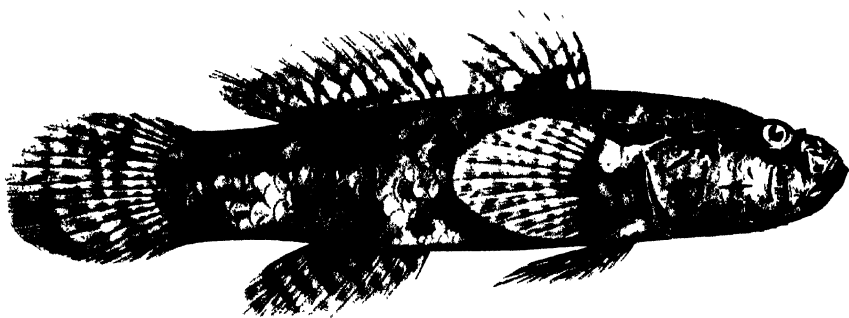
- Fig. 1. *Scartelaos viridis*, Buchanan. A specimen 136 mm. long, from the Burnett River Heads, Queensland.
- „ 2. *Gobiodon verticalis*, Alleyne and Macleay. A specimen 47 mm. long, from Green Island, near Cairns, Queensland.
- „ 3. *Callogobius sclateri*, Steindachner. A specimen 47 mm. long, from Two Isles, North Queensland.
- „ 4. *Callogobius hasseltii*, Bleeker, var. *mucosus*, Günther. A specimen 85 mm. long, from Port Jackson.



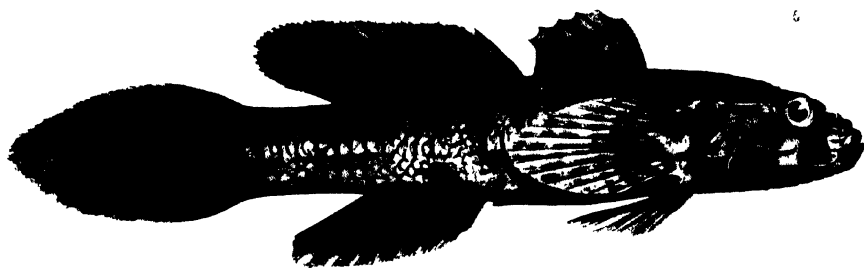
1



2



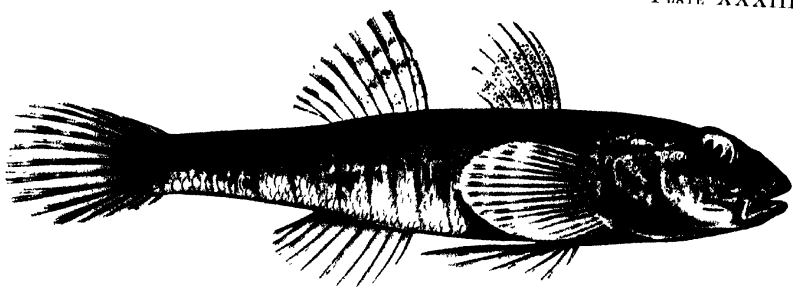
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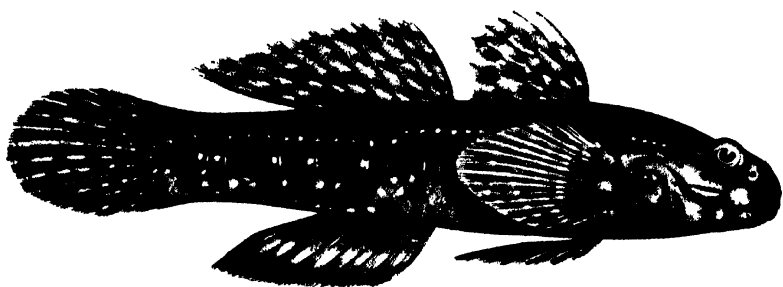
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EXPLANATION OF PLATE XXXIII.

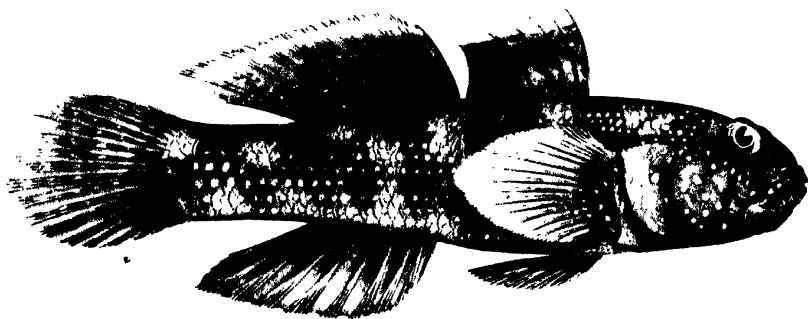
- Fig. 1. (*Gobius*) *hinsbyi*, Johnston. A specimen 86 mm. long, from Wedge Bay, Hobart, Tasmania.
- „ 2. *Gobius ornatus*, Rüppell. A specimen 84 mm. long, from Murray Island, Torres Strait.
- „ 3. *Mapo fuscus*, Rüppell. A specimen 86 mm. long, from Darnley Island, Torres Strait.
- „ 4. *Mapo krefftii*, Steindachner. A specimen 61 mm. long, from Port Jackson.



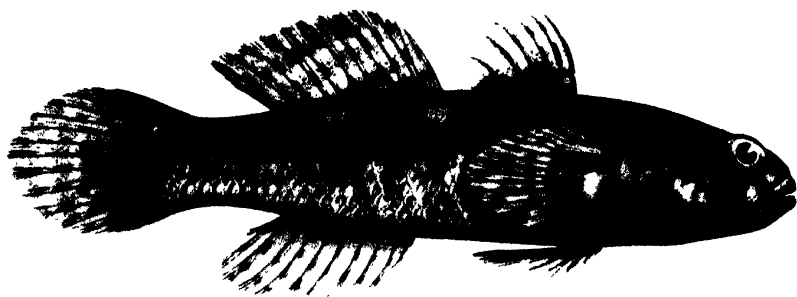
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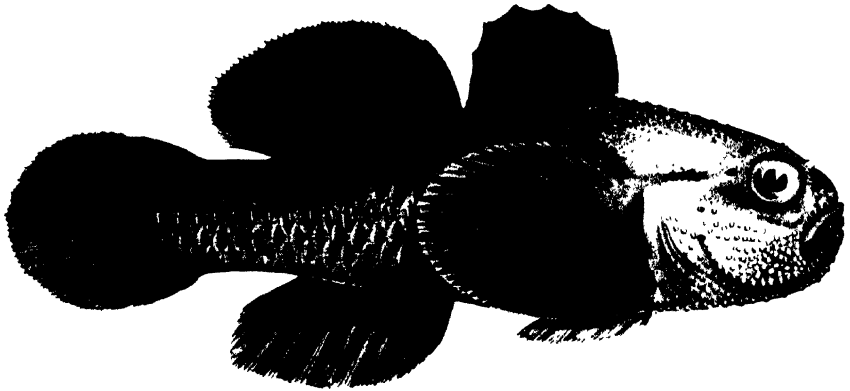
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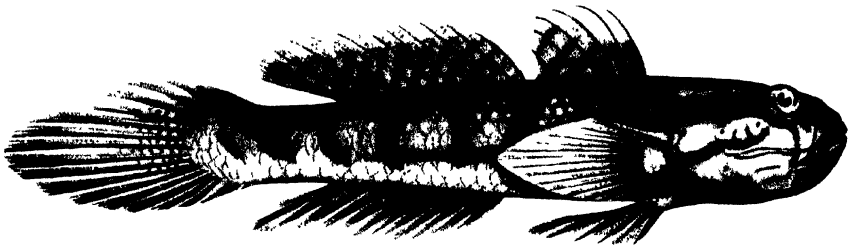
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EXPLANATION OF PLATE XXXIV.

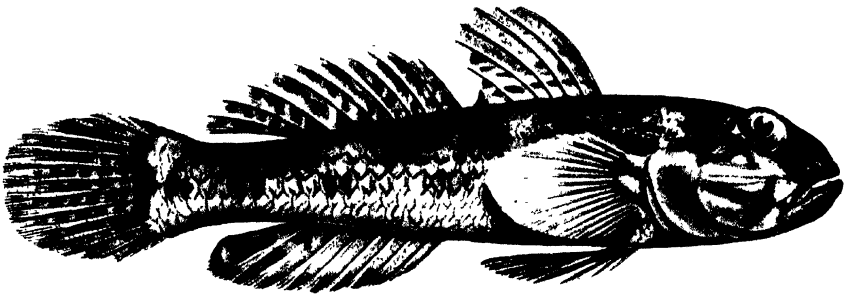
- Fig. 1. *Paragobiodon echinocephalus*, Rüppell. A young specimen $23\frac{1}{2}$ mm. long, from Masthead Island, Queensland.
- „ 2. (*Gobius*) *semifrenatus*, Macleay. A specimen 113 mm. long, from Botany Bay, New South Wales.
- „ 3. *Rhinogobius leftwichii*, Ogilby. A specimen 66 mm. long, from the Great Sandy Strait, Queensland.
- „ 4. (*Gobius*) *lateralis*, Macleay, var. *obliquus*, var. nov. Holotype of the variety, 56 mm. long, from Rose Bay, Port Jackson.



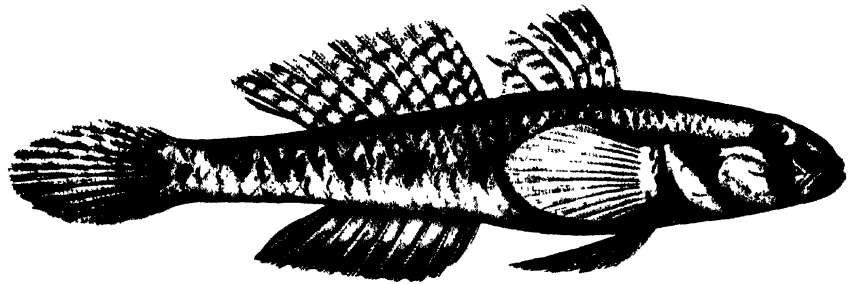
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2



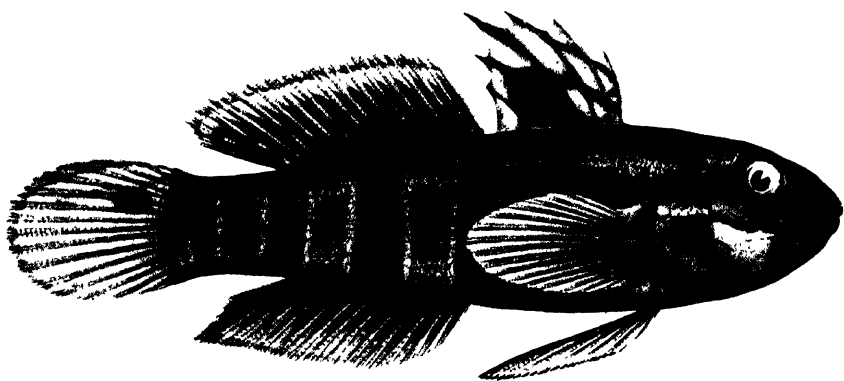
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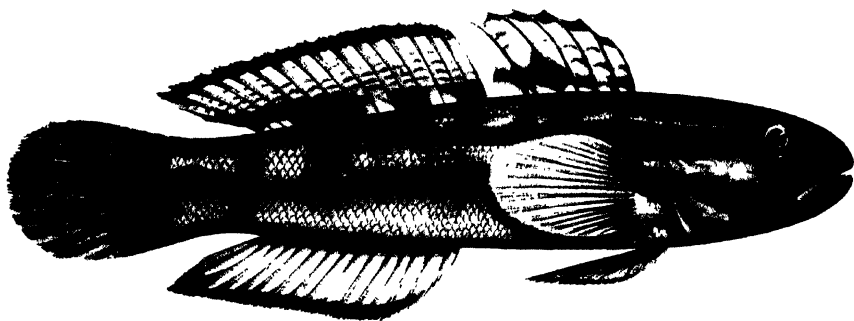
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EXPLANATION OF PLATE XXXV.

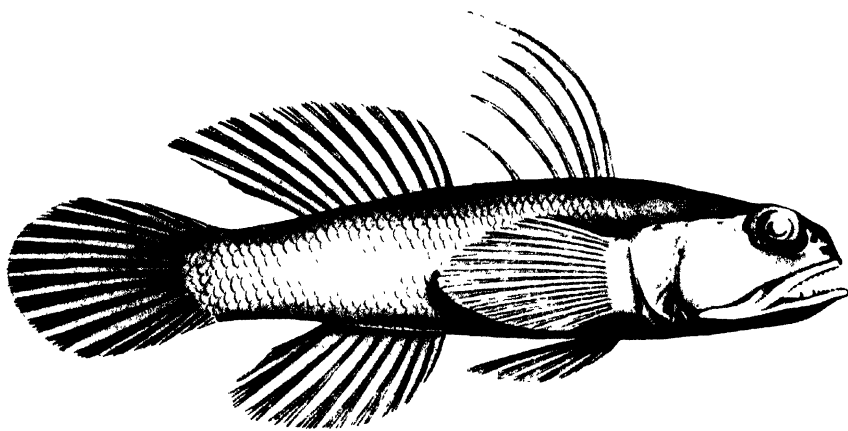
- Fig. 1. *Amblygobius phalaena*, Cuvier and Valenciennes. A specimen 77 mm. long, from Murray Island, Torres Strait.
- „ 2. *Amblygobius bryoensis*, Richardson. A specimen 92 mm. long, from Queensland.
- „ 3. *Waitea maxillaris*, Macleay. Holotype, 65 mm. long, from Port Darwin.



1



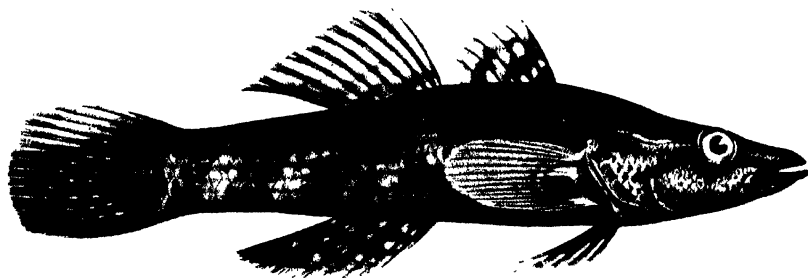
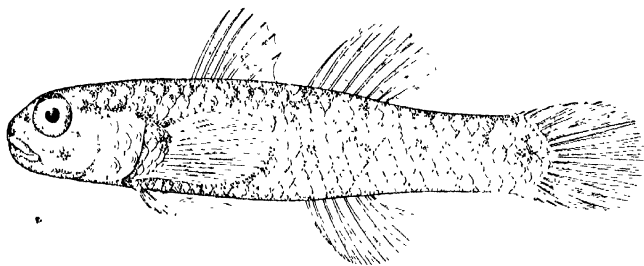
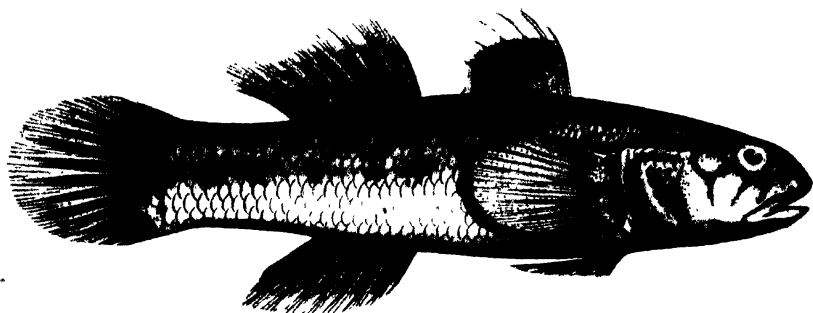
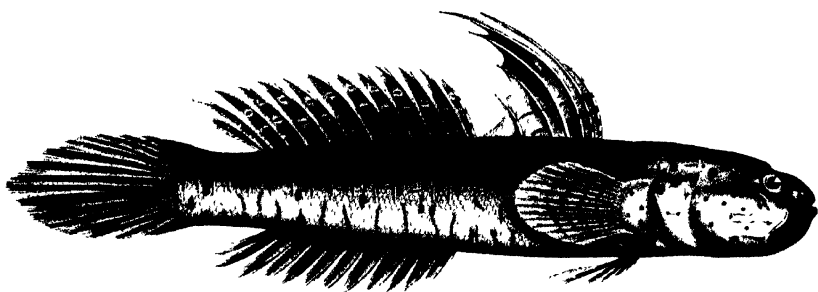
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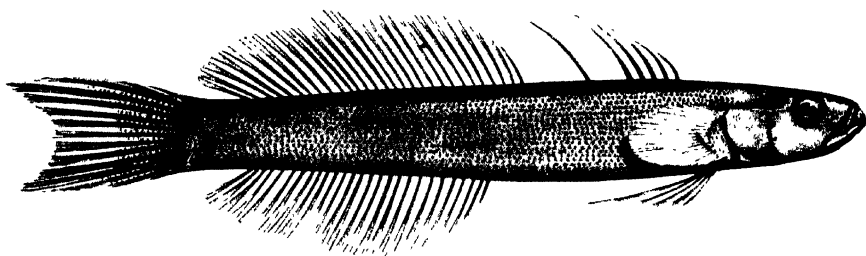
EXPLANATION OF PLATE XXVI.

- Fig. 1. *Cryptocentrus gobioides*, Ogilby. Cotype of *Gobius cristatus*,
Macleay, 90 mm. long, from Port Jackson.
- „ 2. *Mugilogobius devisi*, nom. nov. Cotype of *Gobius stigmaticus*, De
Vis, 45 mm. long, from Moreton Bay, Queensland.
- „ 3. *(Gobius) flavescens*, De Vis. A cotype, 32 mm. long, from Moreton
Bay, Queensland.
- „ 4. *Butis amboinensis*, Bleeker. A specimen 133 mm. long, from
the Brisbane River, Queensland.

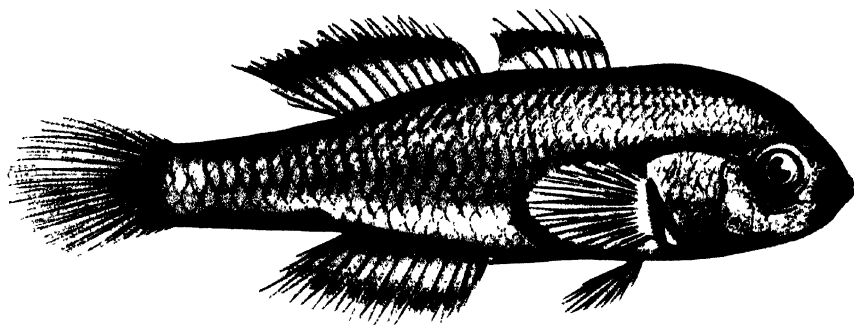


EXPLANATION OF PLATE XXXVII.

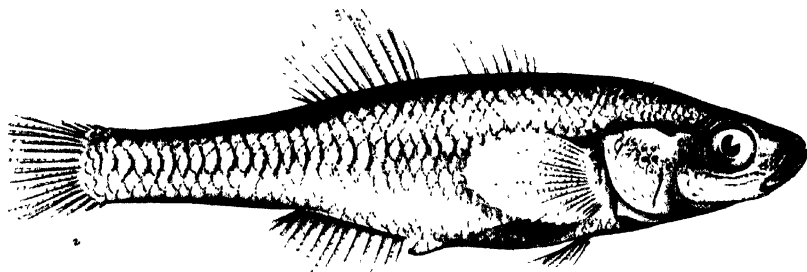
- Fig. 1. *Ptereleotris microlepis*, Bleeker. Holotype of *Eleotris elongata*, Macleay, 93 mm. long, from Darnley Island, Torres Strait.
- „ 2 *Carassiops (Austrogobio) klunzingeri*, Ogilby. Adult male, 57 mm. long, from the Cudgegong River, New South Wales.
- „ 3. *Carassiops (Austrogobio) klunzingeri*, Ogilby. Adult female, 42 mm. long, from the Cudgegong River, New South Wales.
- „ 4. *Valenciennesa muralis*, Cuvier and Valenciennes. A specimen 109 mm. long, from Dunk Island, Queensland.



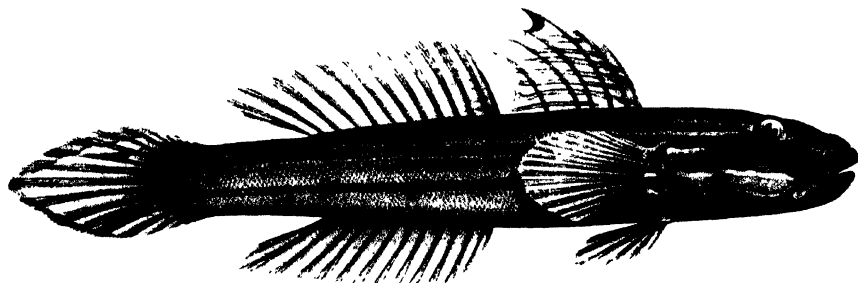
1



2



3



4

LISTS OF HIEROGLYPHICAL SIGNS AND WORDS IN THE FUNERARY INSCRIPTION OF NETER-NEKHT

BY

A. ROWE

(Author of "Guide to Egyptian Antiquities in the
South Australian Museum").

In Plate xxvii. of the present volume I gave a complete copy of the Egyptian text on the coffin of Neter-Nekht in the Australian Museum, and I now present full lists of the hieroglyphical signs and words in this ancient inscription.

With the aid of these lists and also the English rendering of the text printed in my former article¹ it should be quite a simple matter for those interested to follow out for themselves the Egyptian words.

For sake of clearness, the pictorial words and signs in the plates are all placed in the same direction, and the numbers of the lines refer to the numbers in my previously published plate.

The following transliteration of the Egyptian inscription on the coffin should also be found useful to the beginner:—






























TRANSLITERATION OF INSCRIPTION OF NETER-NEKHT.

Line (1) AMAKHI KHER AST, MAA-KHERU. (2) AMAKHI KHER SERQET, NETER-NEKHT. (3) AMAKHI KHER PAUT NETERU NETCHENT, NETER-NEKHT. (4) AMAKHI KHER NEHT-HET, . . . (5) AMAKHI KHER PAUT NETERU AAT, NETER-NEKHT, MAA [KHERU]. (6) AMAKHI KHER NET, NETER-NEKHT. (7) NESUT HETEP DA ANPU NEB SEPA, KHENTI NETER-HET; DA-F TCHA-K PET, SMA-K AR EN NETER AA, NEB PET, NETER-NEKHT, ARI EN . . . TI. (8) NESUT HETEP DA ANPU, DEP-DU-F, AM UT, NEB TA-TCHESER, QEREST NEFERT EM SEMT-AMENTET; KHEP-F EM HETEP, SEP-SEN, EM AN-F ENT NETER-KHER, NETER[-NEKHT]. (9) AMAKHI KHER HAPI, NETER . . . (10) AMAKHI KHER GEB, NETER-NEKHT. (11) AMAKHI ER (doubtless KHER) NUT, NETER-NEKHT. (12) AMAKHI KHER QEBHSENNUF, NETER-NEKHT. (13) NESUT HETEP DA ASAR NEB DEDDU, NETER AA, NEB ABDO; DA-F PER-KHERU TA, HEQT, AH, APD, MENKH, NETER-SENTHET, MERHET, KHET NEBT NEFERT EN MER AHET, NETER-NEKHT. (14) AMAKHI KHER AMSETHA NETER-NEKHT. (15) AMAKHI KHER SHU, NETER- (16) AMAKHI KHER TEPNET, NETER-NEKHT. (17) AMAKHI KHER DUAMUTEF, NETER-




























¹ Rowe—"An Ancient Egyptian Coffin in the Australian Museum" (*Records Australian Museum*, xii., 8, 1919, p. 179.)






COFFIN OF NETER-NEKHT.

Complete list of hieroglyphical signs.












Sign	Value	Picture of	Meaning (if an ideograph)	Line No.
	<i>a (uleph)</i>	eagle	—	7, 13
	<i>a (short)</i>	leaf	—	1-6, 8-12, 14-17
	<i>ab</i>	chisel (?)	—	13
	<i>ah</i>	ox's head	ox	13
	<i>amaḥh</i>	?	devotee	1-6, 9-12, 14-17
	<i>amentet</i>	feather on standard	west	8
	<i>am</i>	?	he who is in	8
	<i>Anpu</i>	jackal on tomb	Anubis (god)	7, 8
	<i>apd</i>	goose's head	goose	13
	<i>ar</i>	eye	to do, to make, to beget	7, 13
	<i>as</i>	seat	seat	1, 13
	<i>as</i>	?	tomb-chamber	8
	<i>a (ayin)</i>	arm and hand	—	7 (in "ar")
	<i>at</i>	bolt	great	5, 7, 13
	<i>ar</i>	staircase	staircase	7
	<i>b</i>	foot	—	10, 13
	<i>du</i>	hill	hill	8, 13
	<i>da</i>	hand with cake	to give	13
	<i>da</i>	arm and hand	to give	7
	<i>da</i>	cake	to give	7, 8, 13
	<i>ded</i>	tree trunk	part of name of town (Deddu)	13
	<i>dep</i>	man's head	he who is on	8
	<i>dua</i>	star	part of name of god (Dua-mutef)	17
	<i>f</i>	cerastes	he, him, it	7, 8, 12, 13, 16, 17
	<i>g</i>	throne	—	10
	<i>geb</i>	duck	Geb (god)	10
	<i>h</i>	coil of rope	—	9, 13
	<i>hap</i>	rudder	part of name of god (Hapi)	9
	<i>hetep</i>	altar	offering, peace	7, 8, 13

Sign	Value	Picture of	Meaning (if an ideograph)	Line No.
	<i>heyt</i>	jug of ale	ale, beer	13
	<i>het</i>	shrine, or house	house, shrine	7
	<i>i</i>	two leaves	—	1-7, 9-12, 14-17
	<i>k</i>	bowl	thee, thy	7
	<i>kh</i>	sieve	—	1-17
	<i>khenti</i>	3 vases in stand	governor, dweller in	7
	<i>kheru</i>	mace (P)	word, voice	1, 13
	<i>m</i>	owl	—	8
	<i>m</i>	?	—	14
	<i>ma</i> , or <i>mu</i> (P)	hand with cake	part of name of god (Dua-mutef)	17
	<i>mau</i>	reed	truth, right	1, 5
	<i>menkh</i>	loom	linen clothes	13
	<i>mer</i>	tongue	overseer	13
	<i>mer</i>	hoe	part of word for "oil"; also to "love"	13
	<i>merhet</i>	vessel of oil	oil	13
	<i>u</i>	wavy line of water	of, in, to, etc.	2, 6-8, 10-13, 16
	<i>neb</i>	bowl	lord	7, 8, 13
	<i>Nebt-het</i>	bowl on house	Nephthys(goddess)	4
	<i>nefer</i>	heart & lungs or musical instrument	beautiful, happy	8, 13
	<i>nesut</i>	reed	royal, king	7, 8, 13
	<i>Net</i>	shuttle	Neith (goddess)	6
	<i>neter</i>	axe	god, divine	2, 3, 5-17
	<i>[ne]kht</i>	branch of tree	strength	2, 3, 5-7, 10, 11, 13, 14, 16
	<i>neter-kher</i>	axe on throne	cemetery	8
	<i>netches</i>	sparrow	small	3
	<i>nu</i>	pot	—	11
	<i>Nut</i>	3 pots; sign for heaven; female determinative "t"	Nut (goddess)	11

Sign	Value	Picture of	Meaning (if an ideograph)	Line No.
	<i>p</i>	square	—	7, 9
	<i>pant</i>	round cake	company	3, 5
	<i>per</i>	house, enclosure	to come forth	13
	<i>per-kheru</i>	house & mace	a coming forth at the voice	13
	<i>pet</i>	sky	heaven	7
	<i>pu</i>	goose flying	—	7
	<i>q</i>	knee	—	8
	<i>qebh</i>	vase	part of name of god (Qebh-seunnf)	12
	<i>qerest</i>	sarcophagus on sledge	burial; sarcophagus	8
	<i>r</i>	mouth	—	1-17
	<i>s</i>	back of chair	—	7, 14
	<i>s</i>	back of chair (written wrong way round on coffin)	—	8
	<i>serqet</i>	scorpion	a goddess	2
	<i>s</i>	bolt	—	7, 8
	<i>sep</i>	circle	a time, a season	8
	<i>sen</i>	two strokes	twice	8
	<i>sen</i>	arrow (?)	part of name of god (Qebhseunnf), and of "incense."	12, 13
	<i>sent</i>	hills or mountains	country	8
	<i>sma</i>	union of reproductive organs	to unite	7
	<i>sepu</i>	centipede (?)	part of name of town (Sepa)	7
	<i>sh</i>	tank (?)	—	15
	<i>shu</i>	ostrich feather	Shu (god)	15
	<i>t</i>	cake	—	1-3, 5-8, 10-11, 13, 16, 17
	<i>tu</i>	cake	cake offering	13
	<i>tu</i>	land	land	8
	<i>th</i>	tongs	—	13
	<i>th</i>	?	—	14


























Sign	Value	Picture of	Meaning (if an ideograph)	Line No.
	<i>teheser</i>	hand with mace	holy, sacred	8
	<i>tcha</i>	fire-stick (?)	—	7
	<i>u</i>	chicken of the quail	—	8, 13, 15
	<i>ut</i>	mummy bandages	embalment	8
	<i>utchat</i>	sacred eye of god Horus	protection	(on eastern side of coffin)






















WORD DETERMINATIVES (not pronounced).




























Sign	Picture and Determinative of	Remarks	Line No.
	town	has the value of "nut," but when written after names of towns is not pronounced	7, 13
	hills or mountains	usual value of "semt," etc.; when used as a determinative, not pronounced	8
	building	not to be confused with "per"—to come forth	8
	land	—	13
	land	—	8
	three strokes	sign of plural	13
	three dots	also sign of plural	12
	pair of legs	indicates action with legs, such as walking, running, etc.	8
	roll of papyrus tied up standard	sign of the abstract names of gods and goddesses sometimes written on standards	13 2, 6
	sky	although in most cases used as word for "heaven" it is also used as an unpronounced determinative, c.f., the word "Nut" (the sky-goddess)	11
	boat	indicates a journey by water	7

COFFIN OF NETER-NEKHT.

Complete vocabulary of hieroglyphical words.





	A (aleph)		Line No.
	<i>ah</i>	farm-lands	13
	A (short)		
	<i>Abdu</i>	Abydos (town)	13
	<i>ah</i>	oxen	13
	<i>Amsethu</i>	Amsethu (god)	14
	<i>am</i>	dweller in	8
	<i>amukhi</i>	devotee	1-6, 9-12, 14-17
	<i>amentet</i>	western hills	8
	<i>Anpu</i>	Anubis (god)	7, 8
	<i>apd</i>	geese	13
	<i>ari</i>	begotten of	7
	<i>Ast</i>	Isis	1
	<i>as</i>	tomb-chamber	8
	<i>Asar</i>	Osiris	13
	A (ayin)		
	<i>aa</i>	} great	7, 13
	<i>uat</i>		5
	<i>ar</i>		7
	D		
	<i>da</i>	to give	13
	<i>da</i>	to give	7
	<i>da</i>	to give	7, 8, 13
	<i>Deddu</i>	Busiris	13
	<i>Duamutef</i>	Duamutef (god)	17
	<i>du</i>	hill	8
	<i>dep</i>	he who is on	8
	<i>dep du-f</i>	he who is on his hill	8
	F		
	<i>f</i>	he, him, it, his	7, 8, 13

	<i>G</i>		Line No.
	<i>Geb</i>	Geb (god)	10
	<i>H</i>		
	<i>Hapi</i>	Hapi (god)	9
	<i>heqt</i>	ale	13
	<i>hetep</i>	offering	7, 8, 13
	<i>hetep</i>	peace	8
	<i>hetep sep sen</i>	"peace, times twice" = in peace, in peace	8
	<i>K</i>		
	<i>k</i>	thee, thy	7
	<i>KH</i>		
	<i>khenti</i>	governor of, dweller in	7
	<i>khep</i>	to journey	8
	<i>kher</i>	before	1-6,9,10,12,14-17
	<i>kheru</i>	word	1, 13
	<i>(maa-kheru)</i>	right of word	1
	<i>khet</i>	things	13
	<i>khet nebt</i>	"things all" = everything	13
	<i>M</i>		
	<i>em</i>	in	8
	<i>maa</i>	right	1, 5
	<i>maa-kheru</i>	right of word	1
	<i>menkh</i>	linen garments	13
	<i>mer</i>	overseer	13
	<i>mer uhel</i>	overseer of farm lands	13
	<i>merhet</i>	oil	13


	N		Line No.
	<i>n</i>	of, in	7, 8
	<i>neb</i>	lord	7; 8, 13
	<i>nebt</i>	all (also, lady)	13
	<i>Nebthet</i>	Nephthys	4
	<i>nefert</i>	beautiful	8
	<i>nefert</i>	beautiful	13
	<i>neant</i>	royal, king	7, 8, 13
	<i>neant</i>	may the king give an offering	7, 8, 13
	<i>hetep</i>		
	<i>da</i>		
	<i>Net</i>	Neith (goddess)	6
	<i>Neter-Nekht</i>	name of the deceased	6
	<i>Neter-Nekht</i>		5
	<i>Neter-Nekht</i>		16
	<i>neter</i>	god, divine	7, 8, 13
	<i>neteru</i>	gods	3, 5
	<i>neter-het</i>	divine house	7
	<i>neter-kher</i>	cemetery	8
	<i>neter-senther</i>	incense	13
	<i>netchest</i>	little	3
	<i>Nut</i>	sky-goddess	11
	P		
	<i>pant</i>	company	3, 5
	<i>per-khern</i>	a coming forth at the voice	13
	<i>per-khern tu heyt</i>	cake and ale offerings which come forth at the voice	13
	<i>pet</i>	heaven	7
	Q		
	<i>Qebhsennuf</i>	a god	12
	<i>qerest</i>	burial; coffin	8

	<i>R</i>		Line No.
	<i>er</i> (or, <i>r</i>) (an abbreviation for <i>kher</i>).	before	11






S

	<i>semt-amentet</i>	mountains of the west	8
	<i>sma</i>	to unite	7
"	<i>sen</i>	twice	8
•	<i>sep</i>	a time	8
•	<i>sep-sen</i>	times twice	8
	<i>Sepa</i>	a town	7
	<i>Serget</i>	a goddess	2



SH

	<i>Shu</i>	a god	15
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T

	<i>ta</i>	cake	13
	<i>tu</i>	land	8
	<i>Ta-Tcheser</i>	"Holy Land "	8
	<i>T'efnet</i>	a goddess	16
	<i>...ti</i>	latter portion of name of deceased's parent (perhaps KHATI)	7

T'CH (or, *DJ*)

	<i>tcha</i>	to traverse, to sail	7
	<i>tcheser</i>	see "Ta-Tcheser." The latter word means "holy."	8

U

	<i>ut</i>	mummy chamber	8
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ONCHIDIIDÆ FROM AUSTRALIA AND THE SOUTH-WESTERN PACIFIC ISLANDS

BY

REX. W. BREFNALL, Invertebrate Zoologist, Australian Museum.

(Plate xxxviii.)

I.—INTRODUCTION.

From the following historical review of the family, it will be seen that, since the discovery of *Onchidium typhæ* by Buchanan in 1800, the biological affinities of the Onchidiidæ have received the attention of many of the eminent authorities of Malacology.

While much remains to be done to bring the knowledge of this group into line with that we have of other groups, this paper may serve as a convenient summary for the use of Australian students, and since it has had for its foundation the excellent works of Semper, Plate, Joyeux-Laffaie and many others, no apology need be offered for the more or less extensive quotations from these authors.

The bulk of the material examined is preserved in alcohol in the collections of the Australian Museum. The absence of marine aquaria has made the much needed observations on the life and habits of even the commonest forms almost impossible.

Onchidium damelii is fairly common on the shores of Port Jackson, living either below water, or under rocks between tide marks. *O. chameleon* was not plentiful when search was made for it in its habitat on the Lane Cove River in March, June and October, 1918. Both these forms exhibited the chameleon-like property of changing their colours, especially when disturbed, or changed to a position of which the background was a different colour to that formerly occupied. From this habit *O. chameleon* received its appropriate name from its author, but this property is not remarked on by other authorities of the group. It may yet be shown that the function of the dorsal eyes may be attributed to this property, rather than their value to the animal in discerning attacks from such enemies as *Periophthalmus*, as was suggested by Semper. This fish, it may be mentioned, is not an inhabitant of Port Jackson. Further, my observations have not shown that either *O. damelii* or *O. chameleon* possess the homing habit that is attributed to *Onchidium* by recent authors¹. The distribution of the family is usually tropical and continental, but one form, *Onchidella patelloides*, Quoy and Gaimard, ranges to the cold waters of South New Zealand, and an un-named species has been mentioned by Woodward² from the Ellice Islands in the Central Pacific.

My thanks and appreciation in the preparation of this paper are due to Mr. C. Hedley, Assistant Curator of the Australian Museum, for his ever ready and valued advice, and to Dr. C. Anderson of the same institution for much assistance in the translation of foreign languages.

¹ Arey and Crozier—Proc. Nat. Acad. Sci. Wash., iv., 11, 1918, p. 319.

² Woodward—Proc. Malac. Soc., iv., 1900, p. 102.

II.—HISTORICAL.

In 1800 Buchanan³ described and figured the first recorded species of *Onchidium*, which he called *Onchidium typha*, an animal living on the leaves of *Typha elephantina* in the fresh or brackish water swamps of Bengal.

Cuvier⁴ in 1804 described his *Onchidium peronii*, an essentially marine form found on the rocks of the sea shore by Peron at Mauritius. Blainville⁵, who was confused by the apparent biological differences between the terrestrial species of Buchanan and the marine species of Cuvier, sought to place *Onchidium peronii* among the Cyclobranchs. Lamarck⁶ has accepted Cuvier's taxonomy, while Férussac⁷ and Rang⁸ followed that of Blainville. Férussac proposed a division of the group, allotting the marine species to his new genus *Onchis*, leaving the terrestrial or fresh water forms to be accommodated by *Onchidium*, of which the type was essentially terrestrial.

Blainville, however, removed Férussac's name, and replaced it by that of *Peronia*, and at the same time re-named Cuvier's species *Peronia mauritiana*; thus again establishing two groups, leaving, as Férussac had, the terrestrial species to *Onchidium*, but allotting the marine species to his new genus *Peronia*. Delle Chiaje⁹ in 1825 followed Blainville and allotted his Mediterranean species *Parthenopeia* to *Peronia*.

In 1830 Cuvier¹⁰ essayed to establish a systematic position for the group of Onchides as they were then known, and placed them at the head of the Aquatic Pulmonates. It must be noted, that while Cuvier was guided by his masterly knowledge of anatomy, and that the position of the external openings were found by him to agree with Buchanan's species, he has left to posterity an anatomical figure reversely drawn in part, as was noted by Stoliczka¹¹. This has no doubt been responsible for some confusion of genera and species.

The voyage of the "Coquille" brought to notice a supposed new example of Onchidiidae recorded by Lesson¹² in 1828 under the name of *Buchanania onchidoiles*, a very large sub-marine species from Conception Bay, Chili. Lesson, however, while offering a figure and description of his species, is not credited with regard since his specimen was not preserved and has not again been seen.

³ Buchanan—Trans. Linn. Soc., v., 1800, p. 132, pl. v., figs. 1-3.

⁴ Cuvier—Ann. du Musée, v., 1804, p. 37.

⁵ Blainville—Journal de Physique, Dec., 1817; Dict. Sci. Nat., xxiii., 1818, p. 504.

⁶ Lamarck—Hist. Anim. sans Verts., 1st ed., vi., 2, 1822, p. 46.

⁷ Férussac—Tabl. Syst., pl. xxxi., 1821.

⁸ Rang—Manual l'Hist. Nat. Mollusques, 1829, p. 152.

⁹ Delle Chiaje—Descrizione e notomia degli animalia senza vertebre della Sicilia, ii., 1825, p. 18, pl. xvi.

¹⁰ Cuvier—Le Règne Animal, ed. 1830, t. iii., p. 46.

¹¹ Stoliczka—Journ. Asiat. Soc. Bengal, xxxviii., pt. 2, No. 2, 1869, p. 99.

¹² Lesson—Voy. de la "Coquille", Zool., 1828, p. 296; figure in Adams—Gen. Rec. Moll., iii., 1858, pl. lxxxi., fig. 4, 4a, p. 235.

In 1831 Ehrenberg¹³ contributed observations on the probable means of respiration, which later was to become a question of considerable argument; and in 1832 Audouin and Milne Edwards¹⁴ recorded some habits and observations on *Onchidium celticum*, noticed by Cuvier, but not described by him. In this year too Deshayes¹⁵ records his opinion that the species already described could not be safely given a systematic position until further research had been conducted.

In his "Figures of Molluscan Animals," by Mrs. Gray, Gray¹⁶ has given his consideration to the family and tabulates a list of four genera and eighteen species; and he introduces the new genus *Onchidella*, to which he allots ten species hitherto known as *Onchidium*, though the specification of this genus is confined to a single phrase "back without radiating processes".

The year 1852 brings an addition of five new species as described by Couthouy and Gould¹⁷.

Forbes and Hanley¹⁸ in 1853 record interesting observations for the time on *Onchidium celticum*, and perhaps correctly desire to credit the authority of the species to Couch and not to Cuvier; to these observations are appended some anatomical notes communicated to the authors by Hancock.

Milne Edwards¹⁹, who had in 1832 given his opinions on the habits and organisation of *Onchidium celticum* with Audouin, withdraws these opinions in his "Leçons sur la Physiologie et l'Anatomie de l'Homme et des Animaux" and agrees with the previously recorded opinions of Ehrenberg.

Keferstein²⁰ in 1865 published some valuable notes on the genitalia of the Onchidiidæ, and while these observations are held by Joyeux-Laffuie to be of little importance, and probably incorrect, it is worthy of notice that Keferstein's observations would cause the Onchidiidæ, to be considered among the Opisthobranchiata.

In 1869 Stoliczka²¹ re-established the faulty description of the genotype *Onchidium typha*, and in addition to describing some new species he gives some observations on their habits.

In 1871 Vaillant²² published his anatomical research on *Onchidium celticum* and Taslé²³ and Recluz²⁴ also made additions to the knowledge of

¹³ Ehrenberg—*Symbolæ Physicæ seu Icones et descriptiones animalium evertibratorum, decas prima*, 1831.

¹⁴ Audouin and Milne Edwards—*Récherches pour servir à l'histoire naturelle du littoral de la France*, i., 1832, p. 118.

¹⁵ Deshayes—*Hist. nat. des vers.*, ii., 1832, p. 663.

¹⁶ Gray—*Vol. iv.*, 1850, p. 117.

¹⁷ Couthouy and Gould—*Wilkes U.S. Explor. Exped.*, xiii., Moll., 1852, pp. 290-293.

¹⁸ Forbes and Hanley—*British Mollusca*, iv., 1853, p. 3, pl. FFF, fig. 6.

¹⁹ Milne Edwards—*Leçons sur la physiologie et l'anatomie de l'homme et des animaux*, 1857-81.

²⁰ Keferstein—*Zeits. wiss. Zool.*, xv., 1865, pp. 86-93, pl. vi., figs. 14, 15.

²¹ Stoliczka—*Journ. Asiat. Soc. Bengal*, xxxviii., pt. 2, No. 2, 1869, p. 99 et seq.

²² Vaillant—*Compte Rendu*, lxxiii., 1871, pp. 1172-1171.

²³ Taslé—*Journ. de Conch.*, xix., 1871, p. 368.

²⁴ Recluz—*Act. Soc. Linn. Bord.*, xxvii. (Mél. Malac.), 1871, pp. 59-62.

this species. *Onchidium verruculatum* is dealt with by Nevill²⁵, while Mörch²⁶ contributes his observations on the colouration of *Peronia verruculata*, *P. mauritiana* and *P. marmorata*. Dall²⁷ described *Onchidella borealis*, Bland and Binney²⁸ *Onchidium schrammi*, and Tapperone Canefri²⁹ *Onchidella grisofusca*.

Of *Onchidella* it is interesting to note that the research on this species by Binney³⁰ showed that a definite jaw was present, while the whole family had previously been considered to be agnathous. H. von Jhering³¹ contributed to the habits of *Peronia*, insisting on the fact that this species lived between high and low water, and defended the branchial qualities of the dorsal appendages—both much debated questions.

In 1880-2 Semper produced his monograph of the family as part of the "Reisen in Archipel Philippinen", this was the first and very successful attempt to bring the family into systematic order, and to establish the relationship of the genera and the species. In this work Semper admits two genera—*Onchidium*, and his new genus *Onchidina*, the former made up of eighteen species divided into six groups characterised by the genitalia.

Fischer and Crosse³² discuss the characters of the family, admitting the genera *Onchidium* without, and *Peronia* with, ramified dorsal appendages, both occurring only on the shores of the Indo-Pacific Oceans; and also the doubtful genus *Buchannania* and the genus *Onchidiella*.

In 1882 the thesis of Joyeux-Laffaie³³ added to the work of Vaillant a complete knowledge of the organisation and development of *Onchidium celticum*; and while this author is sceptical of the accuracy of the work done by his predecessors, his taxonomy is at fault, and his observations would cause the systematist to remove the family from the Pulmonata to the Nudibranchiata. As a result of this paper Brock³⁴ also came to the conclusion that *Onchidium* was a Nudibranch "in process of becoming an air breather". Bergh³⁵, however, who must be admitted to be a leading authority on the Nudibranchiata, rejects this opinion entirely; and von Jhering³⁶ is opposed to the opinions of Bergh.

Until 1894 new species were being continually described, among those of interest to Australia being *Onchidium chameleon*, described by Brazier³⁷ from the Lane Cove River (Port Jackson).

²⁵ Nevill—Proc. Asiat. Soc. Bengal, Dec. 1870.

²⁶ Mörch—Journ. de Conch., xx., 1872, p. 325; and Vid. Medd., xi., 1872, p. 28.

²⁷ Dall—Am. Journ. Conch., vii., 1872, p. 185.

²⁸ Bland and Binney—Ann. Lyc. N.York, x., 1874, pp. 339-341, pl. xvi., figs. 3-5.

²⁹ Tapperone Canefri—Malac. Viag. Magent., 1873, p. 101, pl. ii., fig. 1a.

³⁰ Binney—P. Acad. Phil., 1876, p. 184, pl. vi., figs. bb, ee.

³¹ Jhering—Ueber die systemm. Stellung von *Peronia* und die Ordnung der Nephropneusta, 1877.

³² Fischer and Crosse—Moll. Mexique, 1878, pp. 683-689, pl. xxxi., figs. 1-12.

³³ Joyeux-Laffaie—Organisation et développement de l'Onchidie (*Thèse pour la Faculté des Sciences de Paris*, 1882).

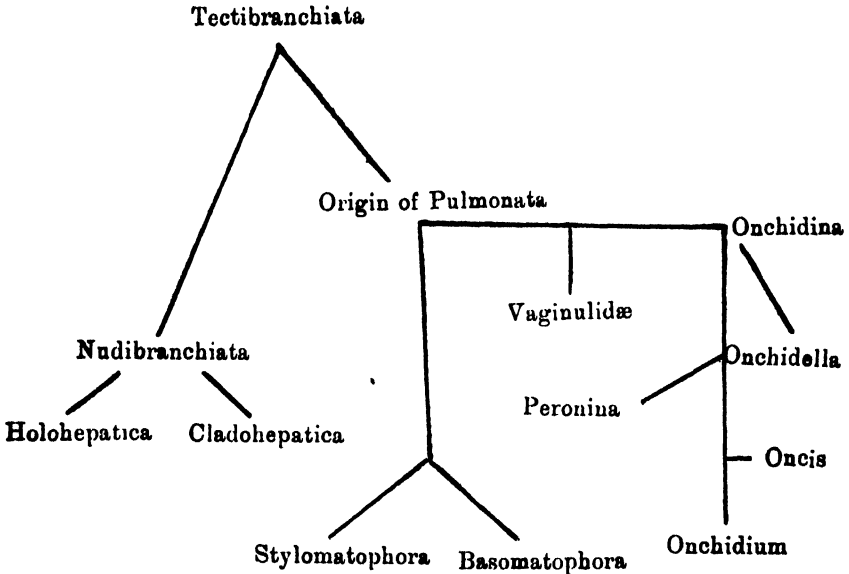
³⁴ Brock—Biol. Centralblatt, 1883, iii., 12, p. 370.

³⁵ Bergh—Morphol. Jahrbuch., Bd. x., 1884, p. 172; and An. Mag. Nat. Hist. (5), xiv., 1884, p. 259.

³⁶ Jhering—Zeits. wiss. Zool., 1879, xli., p. 289.

³⁷ Brazier—Proc. Linn. Soc. N.S.Wales, x., 1886, p. 729.

In 1893 Plate³⁸ brought the family into more permanent and stable condition, establishing the genera and species; and with this paper, so thorough in all its stages, is offered a systematic position of the genera as follows:



Of the subsequent specific and anatomical work by Haller³⁹, Fujita⁴⁰, Wissel⁴¹, Farran⁴², Pelseneer⁴³, Stantschinsky⁴⁴, and many others, little comment need be made, since the work of these authors makes valuable additions and no alterations to the establishment of the family as set by Plate, and closely followed by Simroth⁴⁵.

III.—THE GENERA.

The following key, based on the work of Plate, has been adapted to the classification of the Australian and South Western Pacific forms:

- A. Male genital opening toward the inside and below the right tentacle.
 - I. With appendicular gland and cartilaginous element generally present in the penis.
 - Onchidium*. Hyponota narrower than the sole of the foot. Head large, and in life projecting freely beyond the mantle border. Form oval or elongate oval.

³⁸ Plate—Zool. Jahrb., Anat., vii, 1893, pp. 93-234, taf. 1-12.

³⁹ Haller—Verh. ver Heidelb., v., 1894, p. 301.

⁴⁰ Fujita—Zool. Mag., vii., 1896, p. 47 (in Japanese)

⁴¹ Wissel—Zool. Jahrb., Suppl., iv. (Fauna Chilensis, i.); 1898, p. 583 et seq.

⁴² Farran—Report on the Ceylon Pearl Fisheries, iii., 1905, p. 329.

⁴³ Pelseneer—Mém. Acad. Belg., liv., 1901, fasc. 3.

⁴⁴ Stantschinsky—Zeits. wiss. Zool. Syst., xxvi., 1908.

⁴⁵ Simroth—Bronn's Klass. u. ord. des Tier. Reichs., iii., 1912, Mollusca, Lief.

Back arched. Border of the mantle not notched and without multicellular glands. Branchial plumes sometimes present; dorsal eyes present and usually arranged in groups.

Oncis. Hyponota as broad or broader than the sole of the foot. Head small and almost always broadly over-reached by the head shield. Form broadly oval, elongate oval, or rounded; back depressed. Mantle border not notched and without multicellular glands. Branchial plumes absent. Dorsal eyes when present not arranged in groups.

- Ia. Anterior portion of the penis armed with cartilaginous hooks; a cartilaginous tube present.....*Onchidium steenstrupii*, Semper.
 „ *marmoratum*, Lesson.
 „ *ambiguum*, Semper.
 „ *vaigiense*, Quoy & Gaimard.
- Ib. Anterior portion of the penis armed with cartilaginous hooks; posterior portion soft but with a cartilaginous element.....*Onchidium verruculatum*, Cuvier.
 „ *tumidum*, Semper.
 „ *melanopneumon*, Bergh.
 „ *peronii*, Cuvier.
- Ic. Anterior portion of the penis smooth, and without cartilaginous hooks; a cartilaginous tube present.
- II. An appendicular gland present, but cartilaginous element absent.....*Onchidium damellii*, Semper.
 „ *griseum*, Plate.
- III. An appendicular gland absent, but cartilaginous element present in the penis.
- a. With small cartilaginous hooks only.....*Onchidium nebulosum*, Semper.
- b. With small cartilaginous hooks and tube.....*Oncis coriacea*, Semper.
- c. Anterior portion of the penis soft and without cartilaginous hooks; a cartilaginous tube present..... *Oncis lutea*, Plate.
- d. Without hooks and cartilaginous tube, but with a small cartilaginous support near the appendicular gland.....*Onchidium cinereum*, Quoy & Gaimard.
- IV. An appendicular gland and cartilaginous element absent.....*Onchidium papuanum*, Semper.
 „ *meriakrii*, Stant.
 „ *fungiforme*, Stant.
 „ *beutschlii*, Stant.
Oncis chameleon, Brazier.
- B. The male genital opening situated to the outside of the right tentacle.
- Peronina*.—The hyponota ascend sharply from the foot. Body form oval. Mantle border notched. Female genital opening situated $\frac{1}{2}$ of the body length anteriorly. Male genital opening double.
- Onchidina*.—No hyponota. Form elongate oval, back not strongly arched. Mantle borders not notched. Head medium in size. Branchial plumes and dorsal eyes absent. Tentacles incapable of retraction. Respiratory opening to the right of the anus.
- Onchidella*.—Body form oval, back arched. Mantle border finely notched or lobed, frequently with large cellular glands discharging at the apex of the lobes. Head small. A slender longitudinal fold, or hyponotallina, runs from the tentacle to the respiratory opening close to the foot border, and on the right side rather near the foot groove; the hyponotallina thus separates the hyponota into a broad finely granulated outer zone and a smooth inner zone. The foot groove runs backwards to the anus, fusing with the muscular anal ring. Branchial plumes and dorsal eyes absent.
- I. Appendicular gland, cartilaginous hooks and tube present in the penis.
- II. Without an appendicular gland, but with cartilaginous hooks and tube present in the penis.....*Onchidina australis*, Semper.
- III. An appendicular gland and cartilaginous element absent.....*Onchidella patelloides*, Quoy & Gaimard.

For comparison, the following classification of Semper is of interest, and while not so complete, is of value; it is adapted here for the Australian and South Western Pacific forms only:

- Group I. An appendicular gland and cartilaginous tube present in the penis.....
Onchidium verruculatum, Cuvier.
 „ *peronii*, Cuvier.
 „ *lunatum*, Semper.
 „ *steenstrupii*, Semper.
- Group II. An appendicular gland present, but cartilaginous tube absent.....
Onchidium trapezoidum, Semper.
 „ *dämelii*, Semper.
- Group III. An appendicular gland absent, but cartilaginous tube present.....
Onchidium coriaceum, Semper.
- Group IV. An appendicular gland and cartilaginous element absent.
Onchidium papuanum, Semper.
- Group V. Without an appendicular gland and cartilaginous element; mantle border with distinct notches and papillæ, the latter bearing glandular openings..
Onchidium reticulatum, Semper (= *patelloides*, Quoy & Gaimard).
- Group VI. An appendicular gland absent, but a cartilaginous support is present.....
Onchidium cinereum, Quoy & Gaimard.

IV.—THE SPECIES.

ONCHIDIUM VERRUCULATUM, Cuvier.

Onchidium verruculatum, Cuvier, Le Regne Animal, 2nd ed., iii., 1830, p. 46 (f.n.); and in Savigny, Descrip. de l'Egypt, Moll., 1809⁴⁶, p. 18, pl. ii., fig. 3. *Id.*, Semper, Reis. im Arch. Phil., iii. (Landmoll., heft v., 1880, p. 255, taf. xxi, fig. 1, taf. xxii., figs. 3-4. *Id.*, Nevill, Proc. Asiat. Soc. Bengal., Dec. 1870 (*vide* Zool. Rec., 1870). *Id.*, Farran, Rep. Ceylon Pearl Fish., iii., 1905, p. 358, pl. vi., figs. 13-22. *Id.*, Fujita, Zool. Mag., vii., 1896, p. 47 (in Japanese). *Id.*, Bergh, Challenger Rep., Zool., x, pt. 1, 1884, p. 148, pl. vii., figs. 7-12, pl. viii., fig. 14. *Id.*, v. Martens in Weber, Zool. Ergebnisse, iv., 1897, p. 126. *Id.*, Jhering, Vergl. Anat. Nervensyst. Moll., 1877, p. 230, taf. iv., fig. 16.

Onchidium verruculatum (Cuv.), Plate, Zool. Jahrb., Anat., vii., 1893, p. 168. *Peronia verruculata* (Cuv.), Schmeltz, Cat. Mus. Godeffroy, v., 1874, p. 96, No. 1574. *Id.*, Keferstein, Zeits. wiss. Zool., xv., 1864, p. 91. *Id.*, Fischer and Crosse, Moll. Mexique, 1878, pl. xxxi., figs. 13-15. *Id.*, Mörch, Vidd. Med., xi., 1872, p. 28; and in Journ. de Conch., xx., 1872, p. 335.

External Characters.—Body form oval, back not strongly arched. Head large, tentacles long and cylindrical. Mantle border smooth; anterior portion of the foot often projecting beyond it. Hyponota smaller than the greatest width of the foot sole.

⁴⁶ In the second edition of "Le Regne Animal", Cuvier thus withdraws his determination of the species submitted to him, and subsequently figured as *O. peronii* by Savigny; and while the name of *O. verruculatum* must remain for *O. peronii pars*, as was followed by Keferstein &c. and others, the figure and description of *O. peronii* in Savigny's work therefore represents the type of *O. verruculatum*, Cuvier.

Average size: Length 3.1 cm. breadth, 3 cm., height 2 cm. Greatest width of the foot sole 1.5 cm.

Mantle sculpture.—The mantle is liberally covered with simple and compound tubercles. Simple tubercles are more numerous than the compound ones and vary in size to about 1.2 mm. in diameter. Compound tubercles are represented by rosettes of from five to seven simple tubercles. Short and bunched branchial papillæ cover an area of the posterior field of the mantle. A few tubercles bear from two to five dorsal eyes; the number and arrangement of these seems to be very variable and is fully discussed by Semper *l.c.*

Colour.—The ground colour above is olive; flecks of brown form a variable pattern in different specimens, while the underside is regularly a lighter olive than the upper side. The top of the head is as dark as the ground colour of the mantle.

Position of openings.—The anal papilla is partly protected by the tail of the foot; the respiratory opening in the median line is closer to the anal papilla than to the mantle border. Male and female genital openings typical of the genus.

Anatomy.—Described and figured by Cuvier and Bergh; partly described and figured by Plate, Farran, Keferstein and others.

Group character.—Anterior portion of the penis with cartilaginous hooks; posterior portion smooth and without cartilaginous element.

Localities.—Brisbane (Semper, Godeffroy Museum); Samoa (Semper, Godeffroy Museum); Cape York and Port Mackay, Queensland (Semper, Kieler Museum); Port Curtis, Queensland (Kesteven Australian Museum); Broken Bay, New South Wales (Australian Museum).

ONCHIDIUM NEBULOSUM, Semper.

Onchidium nebulosum, Semper, Reis. im Arch. Phil, iii., Landmoll., v, 1880, p. 257, taf. xxi., figs. 2-4.

Onchidium nebulosum (Semper), Plate, Zool. Jahrb, Anat, vii., 1893, p. 171.

External characters.—Body oval, back strongly arched. Head small, tentacles long. Hyponota sloping and raised, and smaller than the greatest width of the foot sole; the latter flat and much broader at the anterior than the posterior-end.

Average size: Length 42 mm., breadth 28 mm., height 16 mm. Greatest width of the foot sole 16 mm.

Mantle sculpture.—The mantle is regularly and thickly covered with small papillæ; at the posterior end the papillæ are more densely arranged and appear to be grouped. Seven to nine eyes are present on many papillæ.

Colour.—The upper surface is regularly brownish in colour, with an irregular pattern of lighter and darker flecks; the underside is a dirty yellow, the upper side of the head being a bluish black.

Position of openings.—The anus is situated on a small papilla, and is entirely covered by the tail of the foot; the respiratory opening is in the median line close to the mantle border. Male genital opening situated to the right and inside the right tentacle and close to its base. Female genital opening typical of the genus.

Anatomy.—Partly described by Semper and Plate.

Group character.—Anterior portion of the penis with hooks, posterior portion soft and without cartilaginous element.

Locality.—Ponape, South-western Pacific (Plate).

ONCHIDIUM GRISEUM, Plate.

Oncidium griseum, Plate, Zool. Jahrb., Anat., vii., 1893, p. 179.

External characters.—Body elongate oval, equally rounded anteriorly and posteriorly; back rounded but not strongly arched. Head large, tentacles long. Hyponota sloping, and smaller than the greatest width of the foot sole.

Average size: Length 27.5 mm., breadth 20 mm., height 16 mm. (Greatest width of the foot sole 17 mm.)

Mantle sculpture.—The mantle is thickly covered with granules and papillæ. The papillæ are regularly one mm. in height, with flattened tops; and around these from five to eight granules are arranged. The granules vary in size, but they are always smaller than the papillæ. Some papillæ carry from one to three eyes and these are lighter in colour than the ground colour of the mantle.

Colour.—The ground colour of the mantle is regularly a greyish white, while the points of the papillæ, as mentioned above, are conspicuously lighter in colour. The foot and undersurface are light and rather yellowish in colour.

Position of openings.—The anal papilla is not protected by the tail of the foot; the respiratory opening in the median line is close to the mantle border. Male and female genital openings typical of the genus.

Anatomy.—Described by Plate.

Group character.—An appendicular gland present, but cartilaginous element absent from the penis.

Locality.—Polynesia (Plate).

ONCHIDIUM PERONII, Cuvier.

Oncidium peronii, Cuvier, An. Mus. Nat. Hist. Paris, v., 1804, p. 38, pl. vi., figs. 1-9. *Id.*, Le Regne Animal, 3rd ed., 1836-49, p. 69 (f.n.). *Id.*, Mém. à l'Hist. et à l'Anat. Moll., xiii., 1817, p. 1, pl. i., figs. 1-9. *Id.*, Férussac, Tabl. Syst. Moll., 1821, pt. 2, p. 6. *Id.*, Lamarck, Hist. nat. An. sans Vert., 1st ed., vi., 1822 (2), p. 46. *Id.*, Deshayes, 2nd ed., vii., 1836, p. 709. *Id.*, Krauss, Südaf. Moll., 1848, p. 72. *Id.*, Semper, Reis. im. Arch. Phil., iii., Landmoll., v., 1880, pp. 258 and 260. *Id.*, Connolly, Ann. S.Afr. Mus., xi., 3, 1912, p. 224. *Id.*, Gray, Fig. Moll. Anim., iv., 1850, p. 117. *Id.*, Quoy and Gaimard, Voy. "Uranie" et "Physicienne", Zool., 1824, p. 428.

Onchidium tonganum, Quoy and Gaimard, Voy. Astrolabe, Zool., ii., 1832, p. 210, pl. xv., figs. 17-18. *Id.*, Semper, Reis im. Arch. Phil., iii., Landmoll., v., 1880, p. 258, taf. xix., figs. 2, 9, taf. xxii., figs. 1, 2, 10. *Id.*, Deshayes, Hist. nat. Anim. sans Vert., vi. (2), 1836, p. 709. *Id.*, Cunningham, Encycl. Britannica, 11th ed., 1910, xi., p. 252, fig. 62. *Id.*, Bergh, Challenger Rep., Zool., x., pt. 1, 1884, p. 142, pl. vi., fig. 19, pl. viii., figs. 1-2.

Onchidium peroni (Cuvier), Plate, Zool. Jahrb., Anat., vii., 1893, p. 172.

Peronia mauritiana, Blainville, Man. de Malac., 1825, p. 489, pl. xlvi., fig. 7, 1827. *Id.*, Dict. Sci. Nat., xxxviii., 1825, p. 523, pl. lxiii., fig. 7, 1816-30.

Peronia corpulenta, Gould, Moll Wilkes U.S. Expl. Exp., xii., 1852, p. 293.

Peronia tongensis (Quoy and Gaimard), Gray, Fig. Moll. Anim., iv., 1850, p. 117.

Peronia tongana (Quoy and Gaimard), Tapparone Canefri, Faun. Mal. N. Guinea, 1883, p. 214. *Id.*, H. and A. Adams, Gen. Rec. Moll., ii., 1858, p. 235, pl. lxxxi., fig. 3.

External characters.—Body elongate oval, not strongly arched. Mantle border smooth in smaller specimens, and somewhat notched in larger ones. Head large, and projecting freely as much as six to eight mm. beyond the mantle border. Tentacles short and conical, and capable of retraction into a more broadly conical base; eyes at the tips surrounded by a darker ring. Hyponota equal to the greatest width of the foot sole.

Average size: Largest specimen examined, length 104 mm., breadth 68 mm., height 20 mm., greatest width of the foot sole 29 mm.; smallest specimen examined, length 50 mm., breadth 35 mm., height 20 mm., greatest width of the foot sole 10 mm.

Mantle sculpture.—The mantle is liberally covered with large and small papillæ, and with coarse and fine granules irregularly arranged. In some areas the papillæ are more or less grouped; the papillæ when grouped and in the middle field, stand as much as 3 mm. from the back, while the isolated and other papillæ average 1 mm. in height. The groups of papillæ are of definite formation, and comprise (1) groups having a central papilla around which are arranged four to six papillæ of the same size; (2) groups where the central papilla is actually made up of four small papillæ, around which are five to seven bunches of three papillæ in each bunch; (3) groups of three to four papillæ appearing as small tufts. The majority of the papillæ bear dorsal eyes, either singly or in irregularly arranged groups; they are more numerous in the middle and posterior field, but are present even around the mantle margin. In large specimens branchial plumes are well developed, close to the posterior mantle border.

Colour.—The ground colour above is olive, with an irregular pattern of lighter and darker patches. The papillæ and granules conform to the change of colour, and in many cases they may be half the ground colour and half the pattern colour. The foot and the underside are regularly yellowish; the upper side of the head being rather more olive in colour.

Position of openings.—The male genital opening is situated in a transverse slit varying to 1.5 mm. in length. The anus is situated on an anal papilla emanating from the foot groove; the tail of the foot is deeply

notched, and in this notch the papilla stands unprotected. The papilla is conical in shape, and varies to 4 mm. in height. The respiratory opening in the median line is 8 mm. behind the anal papilla, and has the form of a perpendicular slit with rounded, but not prominent lips.

The female genital opening is situated on a small papilla lying at the head of the genital groove; in this species the groove is very conspicuous, and may be easily followed as far as the frontal shield, where it turns inwards to the pore of the foot gland situated behind the mouth.

Anatomy.—Described and figured by Bergh; histology of the dorsal tubercles described by Semper and Plate.

Group character.—Anterior portion of the penis armed with cartilaginous hooks; posterior portion soft, but with a cartilaginous element.

Localities.—Samoa, South-western Pacific (Semper, Godeffroy Museum); Port Dorey, New Guinea (Quoy and Gaimard); Santa Cruz, South-western Pacific (Australian Museum, Coll. Jennings); Buccaneer Group, Western Australia (Australian Museum, Coll. Basedow).

ONCHIDIUM MERIAKRII, *Stantschinsky*.

Onchidium meriakrii, Stantschinsky, Zool. Jahrb., Syst., xxv., 1907, p. 355, taf. xii., figs. 1-3.

External characters.—Form oval, back strongly arched. Head small, tentacles long, and conical. Hyponota smaller than the greatest width of the foot sole.

Average size: length 33 mm., breadth 19 mm., height 17 mm.; greatest width of the foot sole, 13.5 mm.

Mantle sculpture.—The mantle appears quite smooth to the naked eye, but is densely covered with very small tubercles visible only with the aid of a lens. Rather larger retracted eye papillæ are irregularly placed over the mantle surface, a more conspicuous papilla occupying the centre of the middle field. Each papilla bears from three to four eyes.

Colour.—The ground colour of the mantle is olive, the middle field being somewhat lighter; and this lighter area is bordered by two darker lines. The edges of the mantle are darker in colour than the ground colour, though the darker colour merges into the lighter, so that the darker area could not be recognised as a border. The underside is regularly a light brown colour, with darker pigment spots placed irregularly over the hyponota.

Position of openings.—The anus is situated on an anal papilla, and is not protected by the tail of the foot; the respiratory opening in the median line is close to the mantle border. Male genital opening is typical of the genus; female genital opening situated 1.5 mm. to the right of the anal papilla.

Anatomy.—Described and figured by Stantschinsky.

Group character.—Appendicular gland and cartilaginous element absent

Locality.—Queensland (type locality, Stantschinsky).

ONCHIDIUM AMBIGUUM, Semper.

Onchidium ambiguum, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 264, taf. xx., fig. 5., taf. xxi., figs. 22, 24.

? *Onchidium vaigiense* (Quoy and Gaimard), Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1880, p. 289.

External characters.—Body globular, back not strongly arched. Mantle border smooth, underside flat. Tentacles short, eyes at the tip ringed with olive. Head very large and projecting beyond the mantle border. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 18-19 mm., breadth 11-12 mm., height 8 mm.; greatest width of the foot sole 5-6 mm.

Mantle sculpture.—The mantle is regularly covered with small granules which are somewhat massed in the middle field. The eyes appear as dark points on the eye papillæ, even with the naked eye. The eyes may be single, and not more than four are present in a group.

Colour.—The ground colour of the mantle is yellowish with a variable and slightly darker pattern. Underside a dirty yellow.

Position of openings.—The anus is situated on a very small papilla, partly protected by the foot; the respiratory opening in the median line is closer to the anus than to the mantle border. Male and female openings typical of the genus.

Anatomy.—Described and figured in part by Semper.

Group character.—Cartilaginous hooks and tube present in the penis.

Locality.—Pelew Island, North Pacific (type locality, Semper); Dunk Island, Queensland (Australian Museum).

ONCHIDIUM VAIGIENSE, Quoy and Gaimard.

Onchidium vaigiense, Quoy and Gaimard, Voy. de l'“Uranie” et “Physicienne”, Zool., 1824, p. 429. *Id.*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 175, taf. vii., fig. 10, taf. xi., fig. 79.

Onchidium vaigiensis (Quoy and Gaimard), Tapparone Canefri, Fann. Mal. N. Guinea, 1883, p. 213.

? *Onchidium ambiguum*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 289.

External characters.—Body broadly oval, almost rounded, back strongly arched. Head small, tentacles short and cylindrical. Hyponota flat, and smaller or equal to the greatest width of the foot sole.

Average size: Length 22 mm., breadth 19 mm., height 13.5 mm.; greatest width of the foot sole 10 mm.

Mantle sculpture.—A regularly fine granulation covers the whole of the mantle; the granules are of the same size, and each possesses a minute light spot marking a glandular opening. In the middle field three or four are recognisable, placed closely together.

Colour.—The colouring is very bright and this species in life is the most brilliantly coloured one of the family. The ground colour is light yellow, and the whole of the mantle surface is marbled with darker yellow.

and brown. In juvenile specimens, broad yellow and brown bands and spots are predominant; while in adult specimens the ground colour prevails. The foot is dirty yellow in colour, while the head is bluish-black. The hyponota are olive, and the respiratory opening is ringed with yellow.

Position of openings.—Typical of the genus.

Anatomy.—Described by Plate.

Group character.—Anterior portion of the penis with cartilaginous hooks; a cartilaginous tube is present.

Locality.—Vaigiu and Rawak, New Guinea (Quoy and Gaimard); Ponape, South-western Pacific (Plate).

ONCHIDIUM STEENSTRUPII, Semper.

Onchidium steenstrupii, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 265, taf. xx., fig. 5, taf. xxi., fig. 22, 24.

Oncidiella steenstrupii (Semper), Tapparone Canefri, Faun. Mal. N. Guinea, 1883, p. 213.

External characters.—Body shape globular, back not strongly arched. Mantle borders smooth. Head large; tentacles short and conical. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 1.9 cm., breadth 1.6 cm., height 1 cm.; greatest width of the foot sole 1.5 cm.

Mantle sculpture.—The mantle appears to be smooth, but is finely granulated. Small groups of papillæ to the right and left of the middle field bear from five to seven eyes.

Colour.—The ground colour of the mantle is light brown, with an irregular pattern of darker flecks. The underside is yellowish-brown, the hyponota and upper side of the head being darker in colour.

Position of openings.—The anus is situated on a small papilla and is well protected by the tail of the foot; the respiratory opening in the median line is half way between the anal papilla and the mantle border. Male and female genital openings typical of the genus.

Anatomy.—Described by Semper.

Group character.—Cartilaginous hooks and tube present in the penis.

Locality.—Ponape, South-western Pacific (Semper, Godeffroy Museum); New Guinea (Semper, Tapparone Canefri).

ONCHIDIUM MELANOPNEUMON, Bergh.

Onchidium melanopneumon, Bergh, Challenger Rep., Zool., x., pt. 1, 1884, p. 129, pl. iv., figs. 25, 27, pl. v., figs. 1-27, pl. vi., fig. 5-18, 20, 21.

Id., Joyeux-Laffaie, Arch. Zool. Expér. (2), iii., 1885, p. ix.

? *Oncidium peroni*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 172.

External characters.—Body rounded, back not strongly arched. Mantle borders smooth. Head large, tentacles long. Hyponota smooth and smaller than the greatest width of the foot sole.

Average size: Length 6.5 cm., breadth 4 cm., Height 2.5 cm.; greatest width of the foot sole 3 cm.

Mantle sculpture.—The mantle is regularly covered with large single granules, and the areas between these by smaller and more closely packed granules. The granules appear greyish in colour compared to the ground colour of the mantle. Minute eyes are present in groups of three to four around a central eye papilla.

Colour.—The ground colour of the mantle is bluish-black, the underside is regularly yellowish.

Position of openings.—Typical of the genus.

Anatomy.—Described and figured by Bergh.

Group character.—The anterior portion of the penis armed with small cartilaginous hooks; posterior portion smooth, a cartilaginous rod is absent.

Locality.—Fiji, South-western Pacific (Bergh); Lord Howe Island, South-western Pacific (Australian Museum).

ONCHIDIUM BEUTSCHLII, Stantschinsky.

Onchidium beutschlii, Stantschinsky, Zool. Jahrb. Syst., xxv., 1907, p. 383, taf. xii., figs. 10-12. *Id.*, Simroth, in Bronn's Tier-Reich., Moll., iii., 1910, Lief. 109-112, p. 244.

External characters.—Body oval in shape, and rather low and flattened. Hyponota sloping toward the sole of the foot, and smaller than its greatest width. Head small, tentacles long and conical. Mantle borders smooth and inclined to be directed upward.

Average size: Length 26 mm., breadth 27 mm., height 14 mm.; greatest width of the foot sole 13.2 mm.

Mantle sculpture.—The mantle is entirely covered with very small granules. Small and fine papillæ are irregularly placed over the middle field, but at the mantle borders are more closely and compactly arranged. The largest papillæ possess retractile points, bearing from three to four eyes, and are surrounded by smaller papillæ, all of which are darker than the ground colour.

Colour.—The ground colour is olive; the granules and papillæ are a darker shade, and where they stand compactly massed their darker colouring forming an irregular pattern. Thus the middle field appears much lighter than the outer field. The underside is regularly olive.

Position of openings.—The anus is situated on an anal papilla partly protected by the tail of the foot. The respiratory opening in the median line is closer to the anal papilla than to the mantle border by one-fifth of the distance.

Anatomy.—Described and figured by Stantschinsky.

Group character.—Appendicular gland and cartilaginous element absent.

Locality.—Queensland (type locality, Stantschinsky).

ONCHIDIUM TUMIDUM, Semper.

Onchidium tumidum, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 262, taf. xx., figs. 3-4, taf. xxiii., fig. 4. *Id.*, Martyn in Weber, Ergebnisse, iv., 1897, p. 126.

Oncidium tumidum, Plate, Zool. Jahrb., Anat., vii., 1893, p. 173.

? *Onchidium punctatum* (Quoy and Gaimard), Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 289. *Id.*, Smith, Voy. "Alert", Zool., 1884, p. 92.

Peronia, sp., Schmeltz, Cat. Mus. Godeffroy, v., 1874, No. 1574a, p. 96.

? *Peronia punctata* (Quoy and Gaimard), Tapparone Canefri, Faun. Mal. N.Guinea, 1883, p. 214.

External characters.—Body egg-shaped, back strongly arched. Mantle border smooth. Head small; tentacles long. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 35 mm., breadth 22 mm., height 15-20 mm.; greatest width of the foot sole 17 mm.

Mantle sculpture.—The mantle is densely covered with large and small granules. Irregularly arranged are a great number of pointed papillæ, and between these stand the somewhat flattened eye bearing papillæ, which are most numerous in the middle field. The eyes are in groups varying from two to fourteen.

Colour.—The ground colour of the mantle is olive, verging to a lighter yellowish colour near the mantle border. The underside is regularly grey.

Position of openings.—Typical of the genus.

Anatomy.—Partly described and figured by Semper and Plate.

Group character.—Anterior portion of the penis with small cartilaginous hooks; posterior portion soft, and without cartilaginous element.

Locality.—Port Mackay, Queensland (Semper); Nudgee and Brisbane, Queensland (Australian Museum); Ponape, South-western Pacific (Plate).

ONCHIDIUM PAPUANUM, Semper.

Oncidium papuanum, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 276, taf. xxi., fig. 17, taf. xxii., fig. 9.

Peronia papuana (Semper), Tapparone Canefri, Faun. Mal. N.Guinea, 1883, p. 215.

External characters. Body oval in shape, back strongly arched. Mantle borders smooth. Head large; tentacles short. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 13-15 mm., breadth 9 mm., height 6-7 mm.; greatest width of the foot sole 6.5 mm.

Mantle sculpture.—The mantle is regularly covered with small granules, with larger granules irregularly situated over the surface; between the granules stand small conical tubercles bearing eyes in groups of three to four.

Colour.—The ground colour of the mantle is dark grey; a radiating pattern of olive to light brown varies in strength of colour in different specimens. The underside is regularly olive.

Position of openings.—Typical of the genus.

Anatomy.—Described and figured by Semper.

Group character.—Penis gland and cartilaginous element absent from the penis.

Locality.—New Guinea (Semper, Vienna Museum); (Tapparone Canefri).

ONCHIDIUM DÄMELII, Semper.

Onchidium damelii, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 270, taf. xx., fig. 2, taf. xxi., fig. 9. *Id.*, Lendenfeld, Proc. Linn. Soc. N.S.Wales, x., 1886, p. 731. *Id.*, Lendenfeld, Quart. Journ. Micro. Sci. (2), vi., 1886, p. 775. *Id.*, Tenison Woods, Journ. Roy. Soc. N.S.Wales, xxii., pt. ii., 1888, p. 170, pl. vii., fig. 9-14. *Id.*, Tapparone Canefri, Fann. Mal. N.Guinea, 1883, p. 213.

External characters.—Body oval, back strongly arched. Head large and often projecting beyond the mantle border. Tentacles short and conical. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 20 mm., breadth 15 mm., height 7 mm.; greatest width of the foot sole 11 mm.

Mantle sculpture.—The mantle is finely granulated between small scattered papillæ. The middle field appears smooth compared to the outer field, where the papillæ are more numerous. Many of the papillæ bear eyes in varying numbers, and these may be so prominent that they cause the mantle to appear spotted. In a number of specimens large multicellular glands are present; their presence is probably contingent on the stage of growth, or they may be seasonal.

Colour.—The colour above is olive or green, and an irregular darker patterning may be present. The undersides of the mantle are dark blue, while the foot and head are yellowish in colour.

Position of openings.—Typical of the genus.

Anatomy.—Described and figured by Semper. Histology of the dorsal tubercles and eyes by Lendenfeld and Tenison Woods.

Group character.—An appendicular gland is present, but cartilaginous element is absent from the penis.

Locality.—Sydney, New South Wales (Semper, from Dämel, Godeffroy Museum); Port Jackson, New South Wales (Australian Museum); ? New Guinea (Tapparone Canefri).

ONCHIDIUM FUNGIFORME, Stantschinsky.

Onchidium fungiforme, Stantschinsky, Zool. Jahrb., Syst., xav., 1907, p. 374, taf. xii., figs. 4-6.

External characters.—The body is egg shaped, back not strongly arched. The greatest breadth is across the anterior part. The hyponota are sloping, and are much smaller than the greatest width of the foot sole. Head small and retracted; tentacles thin and short.

Average size: Length 24.3 mm., breadth 18.2 mm., height 13 mm.; greatest width of the foot sole 10 mm.

Mantle sculpture.—The mantle is more or less thickly beset with granules and papillæ. In the middle field they are sparsely arranged, but in the outer field they are dense; the papillæ of the middle field are smaller and more retracted than those in the outer field, which are larger and stand erectly. The papillæ may bear from three to four eyes. The areas between the papillæ are finely granulated.

Colour.—The ground colour of the mantle is olive; a darker patch occupies the middle field, and the papillæ are of a darker hue than the ground colour, and some of them have a distinct ring of darker colouring near the apex. The ground colour is more distinctly seen on the anterior part of the body, while the outer field becomes rather darker in colour because of the arrangement of the papillæ in this area. The underside is light brown, only the head and prominent lips being darker.

Position of openings.—The anus is situated on a small papilla and is not protected by the foot sole; the respiratory opening in the median line is about 1 mm. from the anal papilla. Male and female openings typical of the genus.

Anatomy.—Described and figured by Stantschinsky.

Group character.—Appendicular gland and cartilaginous element absent from the penis.

Locality.—Queensland (type locality, Stantschinsky).

ONCHIDIUM CINEREUM, Quoy and Gaimard.

Onchidium cinereum, Quoy and Gaimard, Voy. "Astrolabe", Zool., ii., 1832, p. 661, pl. xv., fig. 29. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 280, taf. xx., fig. 11, taf. xxiii., fig. 13. *Id.*, Deshayes, Anim. sans Vert., 2nd ed., vii., 1836, p. 710.

Onchidella cinerea (Quoy and Gaimard), Gray, Fig. Moll. An., iv., 1850, p. 117. *Id.*, H. and A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

External characters.—Body rounded and depressed. Head large, tentacles small and conical. Mantle borders smooth. Hypouota smaller than the greatest width of the foot sole.

Average size: Length 13 mm., breadth 9.5 mm., height 7 mm.; greatest width of the foot sole 6 mm.

Mantle sculpture.—The mantle is liberally covered with papillæ, a number of which is set in depressions which cause them to assume a lateral direction. Three to four eyes are borne on most of the papillæ. The area between the papillæ is finely granulated.

Colour.—The ground colour is a light brown, while a few flecks of darker colouring may form an irregular pattern in some examples. The underside is regularly a dirty yellow colour.

Position of openings.—Typical of the genus.

Anatomy.—Described and figured by Semper.

Group character.—Cartilaginous hooks and tube absent, but a cartilaginous support is present with the appendicular gland.

Locality.—Tonga Tabu, South-western Pacific (Quoy and Gaimard; Semper, Godeffroy Museum).

ONCIS CINEREA, *Odhner*.

Oncis cinerea, Odhner, Kungl. Sv. Vet. Akademiens Handlingar, lii., 16, 1917, p. 73, pl. iii., figs. 75, 76.

"Body depressed, rounded ovate with the notaeum densely papillose with rather regularly scattered small and large papillæ. Eyes only about 15, wide apart from each other, occupying chiefly the median part of the notaeum. Hyponotum smooth, its breadth about 1 of the foot sole. Anus free, immediately behind the foot end. Respiratory orifice in the median line, at of the breadth of the hyponotum from the anal pore. Colour greyish, with a blackish dorsal stripe and an ovate blackish girdle round the median part of the back; toward the margin black dots.

Dimensions: length 9, breadth 8.5, height 3 mm. Locality Broome (Western Australia) in the mangrove mud (18/6/1911). 1 sp.

Though this specimen might only be a young individual, it cannot be referred to any of the 9 known species constituting the genus *Oncis* (cf. Stantschinsky 1907). With respect to its shape, it shows close relation to *O. martensi*, Plate, which has, however, a uniform lemon colour. According to Stantschinsky (1907), *Onchidium* and *Oncis* are 'richtiger als durch Übergangsmerkmale zusammenhangende Subgenera anzusehen'".

ONCIS CHAMELEON, *Brazier*.

(Plate xxxviii., figs. 1-4.)

Onchidium chameleon, Brazier, Proc. Linn. Soc. N.S.Wales, x., 1886, p. 729. *Id.*, Tenison Woods, Journ. Roy. Soc. N.S.Wales, xxii., 2, 1888, p. 170-171. *Id.*, Lendenfeld, Proc. Linn. Soc. N.S.Wales, x., 1886, p. 730.

Oncis chameleon (Brazier), Hedley, Journ. Roy. Soc. N.S.Wales, li. (Suppl.), 1918, p. M95.

External characters.—Body elongate oval, back not strongly arched. Mantle borders smooth. Hyponota smaller than the greatest width of the foot sole. Head small, tentacles short and conical and ringed; eyes at the tips black.

Average size: Length 38 mm., breadth 22 mm., height 17 mm.; greatest width of the foot sole 15 mm.

Mantle sculpture.—The mantle is regularly and finely granulated over the whole surface. No dorsal eyes are present, and branchial plumes are absent.

Colour.—The ground colour above is olive; two yellow and prominent lines four mm. apart at the insides, originate two mm. from the anterior edge of the mantle, and run backwards to join in a V, five mm. from the posterior edge of the mantle. Yellow patches of variable shapes form an irregular patterning. The foot and the head are yellowish in colour, and the underside of the mantle is bluish-black.

Position of openings.—Typical of the genus.

Group character.—Appendicular gland and cartilaginous element absent from the penis.

Obs.—No examples of this species were in the collections of the Australian Museum, and only a few were collected by the author, Mr. John Brazier, who at later dates could not find further examples. From his statements it would seem probable that the types and co-types were dissected by von Lendenfeld, as a result of which his paper was written. I collected two specimens in June 1918, one of which becomes the meta-type in the collections of the Australian Museum.

Anatomy.—Opened from the dorsal surface the viscera is seen (Pl. xxxviii., fig. 1) compactly massed in a well defined mantle cavity; the anatomy does not possess any extra-ordinary features compared with the described anatomy of other species of this genus.

Alimentary system.—The mouth is two mm. in length formed by rounded lips. The bulbus pharyngeus is strong and large, flattened on the lower side and otherwise rounded. The radula is deep brown in colour, and the dental formula differs with its shape; a complete anterior row having 96 : 1 : 96 while the central and posterior rows have 136 : 1 : 136

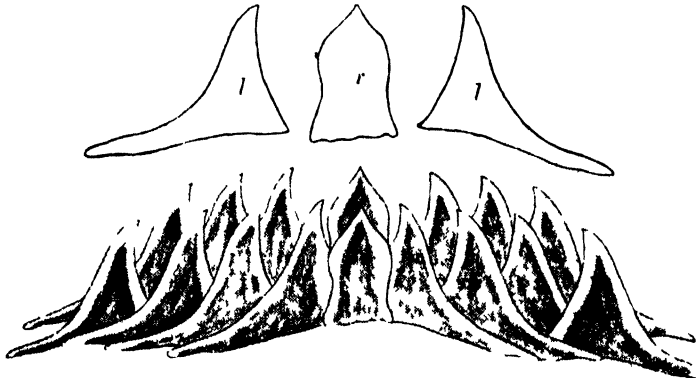


Fig 1

(Fig. 1). There is no definite jaw but strong dagger shaped palatal plates are present. The oesophagus leads from the bulbus pharyngeus to turn slightly to the left, between the large and yellowish salivary glands. The first stomach is small, and its internal walls have deep furrows in which are situated minute papillæ of irregular arrangement; the opening of the hepatic duct is small and does not seem to be muscularly controlled. The second stomach is considerably larger than the first, and the furrows of the first stomach continue to line the walls of the second. A short neck connects the second stomach to the third stomach; this latter is large and pear shaped, with lamellated walls, and leads by the narrower posterior end to the intestine, at two mm. from the commencement of which is a widened ampulla, which Cuvier considered to be an especial stomach.

The liver is tri-lobed and dirty yellowish in colour, occupying a large part of the visceral mass. The anterior lobe is concavo-convex in shape and its surface is traversed by slight furrows; the lower lobe is the smallest of the three, and the ducts leading to the hepatic duct are, as this

latter is, strong and elastic. The posterior liver is very large with a furrowed surface. The bile duct leading to the second stomach is free for 1.5 mm. of its length.

Vascular system.—The heart is contained in a thin walled pericardium, the walls of which are fused with the lung posteriorly. The ventricle is 3.5 mm. in length and the atrium four mm. The aortic valves are conspicuous, and with the atrio-ventricular valves are crescentic in shape. The blood for aëration is conducted from the sinus venosus by the sinus laterales, and the sinus pediaeus medianus; and after aëration is passed to the atrium via the pulmonary veins.

Nervous system.—The central nervous ganglia is contained in a capsule of connective tissue, and is situated above the oesophagus; upper and lower divisions are discernible connected by commissures. The upper or cerebral ganglion gives off the nervus tentacularis to the tentacle, and from this the thin nervus opticus originates. A delicate set is separable into nervi velares, nervi orales, nervi labiales and a distinct nervus bulbus pharyngeus, while a nervus genitalis externus turns sharply downwards to the penis. From the lower ganglion a delicate network includes the origin of the pleural ganglia and the stronger pedal ganglia from which the pedal branches arise. The buccal ganglion is triangular in shape and is much longer than the neighbouring ganglia, with which it is connected by commissures; two branches arise to innervate the oesophagus and the salivary glands.

Respiratory system.—The lung is large and soft grey in colour, the outer walls fusing with the inner side of the mantle, and the anterior walls with the pericardium. The inner walls are very spongy in texture, and are covered with a thin tissue which is continued into the respiratory tube opening on the lower inner side.

Excretory system.—Associated with the lung is a small yellowish kidney, with a very narrow urinary chamber. The organ of Bojanus does not seem to be present. The intestinal system is detailed under the Alimentary system.

Reproductive system.—On lifting the visceral mass, the genital mass is seen to occupy about a quarter of the anterior area of the body; the whole is covered and connected by membrane, which is easily removed with a needle point. The yellowish seminal bladder protrudes well into the mantle cavity, and the hermaphrodite duct is conspicuous by its size, yellowish colour and deep convolutions. It is somewhat spherical in shape and the main ducts—the female leading to the albuminiparous gland and the male to the vas deferens—are thick and strong. The vas deferens accompanies the vagina, to which it is connected by membrane, as far as the female genital opening, and from here it goes deeply into the body wall and becomes free again near the opening of the dart gland, continuing from here as a more thickened coil to the penis. The penis is sausage shaped and about four mm. in length; no appendicular gland or cartilaginous hooks are apparent.

Histology.—The histology of the dorsal tubercles of the *Onchidiidae* has been admirably worked by Semper, and compared in this species by Lendenfeld and Tenison Woods.

Locality.—Lane Cove River (Port Jackson)..

ONCIS CORIACEA, Semper.

Onchidium coriaceum, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 271, taf. xix., figs. 1, 16, taf. xxi., fig. 7, taf. xxiii., fig. 12.

Oncis coriacea (Semper), v. Martens in Weber, Ergebnisse, iv., 1897, p. 127. *Id.*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 185.

? *Onchidium tigrinum* (Stoliczka), Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 271.

? *Onchidium marmoratum* (Lesson), Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 271.

? *Oncidium marmoratum* (Lesson), Plate, Zool. Jahrb., Anat., vii., 1893, p. 185.

External characters.—Body oval, somewhat depressed. Head large, tentacles very long and slightly lobed at the tips. Mantle borders smooth. Underside flat. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 47 mm., breadth 27 mm., height 15 mm.; greatest width of the foot sole 10 mm.

Mantle sculpture.—The mantle is finely granulated between a number of short conical papillæ, some of which bear eyes in varying numbers.

Colour.—The ground colour of the mantle is olive, with an irregular darker pattern; the underside is regularly yellowish.

Position of openings.—Typical of the genus.

Anatomy.—Described by Plate.

Group character.—Anterior portion of the penis with small cartilaginous hooks; a cartilaginous tube is present.

Locality.—Brisbane, Queensland (Semper, Godeffroy Museum); Finche's Bay, Cooktown, Queensland (Australian Museum).

ONCIS LATA, Plate.

Oncis lata, Plate, Zool. Jahrb., Anat., vii., 1893, p. 189, taf. vii., fig. 2. *Id.*, v. Martens in Weber, Ergebnisse, iv., 1897, p. 127.

External characters.—Body broadly oval, almost circular and moderately high, but not strongly arched. Head small, tentacles short and conical. Mantle borders smooth. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 29 mm., breadth 27 mm., height 17 mm.; greatest width of the foot sole 8 mm.

Mantle sculpture.—The mantle is regularly covered with granules and papillæ. The papillæ are conical in shape, and standing one mm. in height and from four to five mm. apart give the mantle a prickly appearance. Eyes are present on all the papillæ.

Colour.—The ground colour of the mantle is brown; a pattern is formed by irregularly shaped and placed white flecks. The foot is dirty grey in colour, while the hyponota are olive verging to a darker area around the mantle border.

Position of openings.—The anal papilla is large but not high; the respiratory opening in the median line is closer to the mantle border than to the papilla. Male and female genital openings typical of the genus.

Anatomy.—Described and figured by Plate.

Group character.—Anterior portion of the penis smooth and without hooks; a cartilaginous tube is present.

Locality.—New Britain, South-western Pacific (Plate).

ONCHIDELLA PATELLOIDES, Quoy and Gaimard.

Onchidium patelloides, Quoy and Gaimard, Voy. "Astrolabe", Zool., ii., 1832, p. 212, pl. xv., figs. 21-23. *Id.*, Dieffenbach, Travels in N. Zealand, ii., 1843, p. 247. *Id.*, Martens, Crit. List. Moll. of N. Zealand, 1873, p. 39. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 279.

Onchidella patelloides (Quoy and Gaimard), Wissel, Zool. Jahrb., Syst., xx., 1904, p. 667, pl. xxv., figs. 75-77.

Onchidella patelloides (Quoy and Gaimard), Hutton, Man. N. Zealand Moll., 1880, p. 28. *Id.*, Suter, Man. N. Zealand Moll., 1913, p. 813, pl. xxxii., fig. 4.

Onchidella patelloidea (Quoy and Gaimard), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

Onchidium reticulatum, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 278, taf. xx., fig. 6, taf. xxi., figs. 16, 20, 23, taf. xxiii., fig. 1.

Onchidella reticulatu (Semper), Plate, Zool. Jahrb., Anat., vii., 1893, p. 205.

Onchidella patelloide (Quoy and Gaimard), Gray, Fig. Moll. An., iv., 1850, p. 117.

External character.—Body oval, back elevated. Mantle border more or less notched. Head small, tentacles short and conical. Hyponota wrinkled and nearly the same width as that of the foot sole. Hyponotal line distinct.

Average size: Length 26 mm., breadth 17 mm., height 8 mm., greatest width of the foot sole 12 mm.

Mantle sculpture.—The mantle is finely granulated between a variable number of large papillæ; marginal glands may be prominent and whitish in colour, and numbering from sixteen to twenty.

Colour.—The ground colour of the mantle is yellowish brown; a variable pattern is presented in different specimens, radiating black streaks being often conspicuous; but the streaks may vary in depth of colour and may be almost inconspicuous.

The front of the head is black; the rest of the underside being regularly greyish white. As mentioned above the marginal glands are whitish in colour, and in some cases are very conspicuous against the darker background.

Position of openings.—The anal papilla is protected by the tail of the foot sole; the respiratory opening in the median line is close to the anal papilla. Male and female genital openings typical of the genus.

Anatomy.—Described by Wissel, Semper, Hutton and Suter.

Group character.—Appendicular gland and cartilaginous element absent.

Obs.—An examination of a series of specimens from New Zealand, Port Jackson and Tasmania, shows a considerable variation in the colouring,

especially in the patterning, which varies from that of Quoy and Gaimard's figure to that of Semper's *O. reticulatum*. I have no doubt that *O. reticulatum*, Semper, is synonymous with this species, and from Couthouy's figure of *O. marginata* this species must be very closely related.

Locality.—Port Jackson, New South Wales (Hedley); Launceston, Tasmania (Simson and Brettnall, Australian Museum); Sydney (Semper, as *O. reticulatum*; Museum Godeffroy). Previously recorded from North and South Islands of New Zealand, and Chatham Island.

ONCHIDINA AUSTRALIS (Gray, m.s.), Semper.

Onchidina australis (Gray, m.s.), Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 287, taf. xix., figs. 14, 15, taf. xxi., fig. 27, taf. xxiii., fig. 10.

Oncidina australis (Gray, Semper), Plate, Zool. Jahrb., Anat., vii., 1893, p. 208.

Onchidella, sp. Schmeltz, Cat. Mus. Godeffroy, v., 1874, p. 96, No. 1843.

External characters.—Body oval, back strongly arched. Underside flat. Head medium in size, tentacles short. Mantle borders smooth. No hyponota.

Average size: Length 30 mm., breadth 13 mm., height 10 mm.

Mantle sculpture.—The mantle is finely granulated between irregularly placed papillæ; the latter stand from three to four mm. apart, and appear whitish in colour against the ground colour of the mantle.

Colour.—Ground colour of the mantle olive, with a pattern of irregularly placed spots or flecks of a darker colour sometimes present; the papillæ as mentioned are whitish in colour, and a dark grey border runs around the body close to the mantle border. The underside of the head and foot are reddish-grey; the border of the mantle extends to the underside and has the same depth of colour.

Position of openings.—The anus is in the median line, while the respiratory opening is close, but to the right of it. The male genital opening is typical of the genus; the female genital opening is also typical but lying very close to the anus.

Anatomy.—Described by Semper and Plate.

Group character.—Appendicular gland absent, but cartilaginous hooks and tube are present in the penis.

Localities.—Brisbane, Queensland (Semper, Godeffroy Museum); Viti, South-western Pacific (Semper, Godeffroy Museum); South Seas (Semper, Kölliker); Noumea, New Caledonia (Australian Museum).

The following species are described from the South-western Pacific. No examples are in the Australian Museum, and their anatomy has not been elaborated by their authors or by subsequent workers. From the figures and descriptions, deficient as they are in detail of a specific character, comparison will be rendered difficult without access to, or a re-description from the types.

PERONIA CORPULENTA, Gould.

Peronia corpulenta, Gould, Wilkes U.S. Expl. Exped., xii., 1852, Moll., p. 293, pl. xxii., figs. 385, 385a. *Id.*, Otia Conchologica, 1862, p. 226.
† Onchidium peroni (Cuvier), Plate, Zool. Jahrb., Anat., vii., 1894, p. 172.
Onchidella corpulenta (Gould), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

Description.—"Animal elongate oval, somewhat truncated in front, deep sea green above, olivaceous beneath; foot pale; back arched, bearing numerous large, elevated, rounded tubercles, with smaller intervening ones; margins undulated; hood projecting beyond the body, broad as the body; heart lobed; lobes circular; simple and deep green above, somewhat violaceous beneath; mouth quite small, orange; tentacles linear, rather stout and long, green; foot two-thirds the length of the body. Length two inches; breadth one inch; height $\frac{1}{2}$ inch.

A large species, somewhat irregular in outline." (Gould).

Obs.—This species has been referred to *Onchidium peronii*, Cuvier, in this paper.

Locality.—Direction Island, Fiji.

PERONIA ACINOSA, Gould.

Peronia acinosa, Gould, Wilkes U.S. Expl. Exped., xii., 1852, Moll., p. 291, pl. xxi., fig. 384, 384a. *Id.*, Otia Conchologica, 1862, p. 226.
Onchidella acinosa (Gould), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

Description.—"Animal elongated, everywhere closely covered with large rounded papillæ of a deep beryl green colour, shaded in the interstices with amethystine: the same colouring is found below, except the foot, which is a slaty violet, half the width of the body. Body attenuated, apparently somewhat cylindrical, equally and acutely rounded at both ends. Tentacles dark blue.

Length nearly an inch and a half; breadth three fifths of an inch.

A fine species having a mulberry like surface, and also remarkable for its unusually dark colours, the general colour being of an amethystine blue, somewhat darker than the rounded papillæ.

Locality.—Fiji." (Gould).

ONCHIDIUM FERRUGINEUM, Lesson.

Onchidium ferrugineum, Lesson, Voy. "Coquille," Zool., ii., 1830, p. 300.
Id., Gray, Moll. Anim., iv., 1850, p. 117. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1882, p. 268.
Peronia ferruginea (Lesson), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 235.

This *Onchidium* is closely related to that of M. de Blainville. It is eighteen lines in length. Its mantle is thick and fleshy, and over flowing the foot, that is to say its sides are nearly vertical. The upper part is

red, covered with papillæ, fleshy compressed and conical when viewed through the microscope. The foot is long, oval, and ending in a point, and somewhat rounded in front; it is yellowish white in colour. In juvenile specimens the part between the mantle and the foot is black. The head is large and striated. The two eye tentacles are short and situated near the mantle border. The mouth is vertical and has fleshy lips. A very conspicuous groove lies by the upper side of the lips and near the extremity of the eye tentacles; this opening leads to the oviduct. The penis is very elongated. It is cylindrical, very twisted and attached at the posterior part of the animal near the intestine, and rising upward becomes dilated near the stomach, and travels forward to the opening near the tentacle. The anus is in the form of a rounded perforation in the median line, and near the posterior border of the mantle. The lung occupies all the posterior portion of the body of the animal. They communicate with exterior by the branchial plumes; these papillæ stand above the papillæ on the posterior part of the mantle, and consists of short perforated tubes, embedded in the dermal tissue of the animal.

This *Onchidium* is essentially marine, and we found it many feet below the surface of the harbour at Dorey, New Guinea (Lesson).

ONCHIDIUM ATER, Lesson.

Onchidium ater, Lesson, Voy. "Coquille," Zool., ii., 1830, p. 300.

Oncidiella atra (Lesson), Tapparone Canefri, Faun. Mal. N. Guinea, 1883, p. 212.

Description.—This *Onchidium* is from twelve to fifteen lines in length, oval, very convex and somewhat reddish on its surface. Its mantle is thick and fleshy and overhangs the foot. The surface is lightly granulated with a deep black colour and some small white veins. The sides of the mantle are thick, and lighter in colour. The foot is oval, transversely striated, pointed and notched at the posterior part to receive the latter part of the intestinal tube. At the sides and on the upper part of the mantle are the branchial plumes, to communicate with the lungs. The two eye tentacles are short and placed near the anterior border of the mantle. The head is globular, having below thick lips around the mouth; this latter is rounded and small. The foot is yellow. The penis is very long, cylindrical, twisted at the posterior part and becomes a long contractile tube enveloped in a thick membrane. A tube connects with the oviduct at the opening near the right of the foot. This *Onchidium* inhabits the harbour of Dorey, New Guinea (Lesson).

ONCHIDIUM GRANULOSUM, Lesson.

Onchidium granulatum, Lesson, Voy. de la "Coquille", Zool., ii., 1830, p. 299, pl. xiv., fig. 2. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1882, p. 289.

Onchidium granulosa (Lesson), Gray, Fig. Moll. An., iv., 1850, p. 117.

Oncidiella granulosa (Lesson), Tapparone Canefri, Faun. Mal. N. Guinea, 1883, p. 212.

Description.—This species belongs to the section of the Onchidiidæ in which the mantle is covered with prominent granules, having the appearance of little tubercles. Its form is oval and its dorsal surface convex; the length varies from fifteen to eighteen lines. The mantle is arched and covered with little warts, and the sides are longer than the foot; but the thick undersurface of the mantle is quite loose. The foot is thick and fleshy with transverse grooves, and is oval. The anus is a large perforation at the extremity of the mantle, and in the median line. The eye tentacles are short and cylindrical, and dilated at the tips to carry the ball of the eye. For description of this see the Ferruginous Onchidium (*O. ferrugineum*). This mollusc is dark green above, lighter in colour at the lower border of the mantle. The foot is yellow. We found it commonly on the beaches at Port Praslin, New Ireland, and under the same circumstances as the preceding species (*Lesson*).

ONCIDIELLA PACHYDERMA, *Plate*.

Oncidiella pachyderma, *Plate*, Zool. Jahrb., Anat., vii., 1893, p. 204.

This species is described by *Plate* from "Victoria". The Australian State is not the locality from whence *Buccholz* collected it; and of the forty-eight localities of this name in a modern atlas, *Plate's* species is probably from a Western Equatorial African locality.

No *Onchidiidæ* have yet been described from Victoria, Australia, but it is obvious that *O. patelloides* should occur there.

ONCIDIELLA TABULARIS, *Tapparone Canefri*.

Oncidiella tabularis, *Tapparone Canefri*, Faun. Mal. N. Guinea, 1883, p. 212.

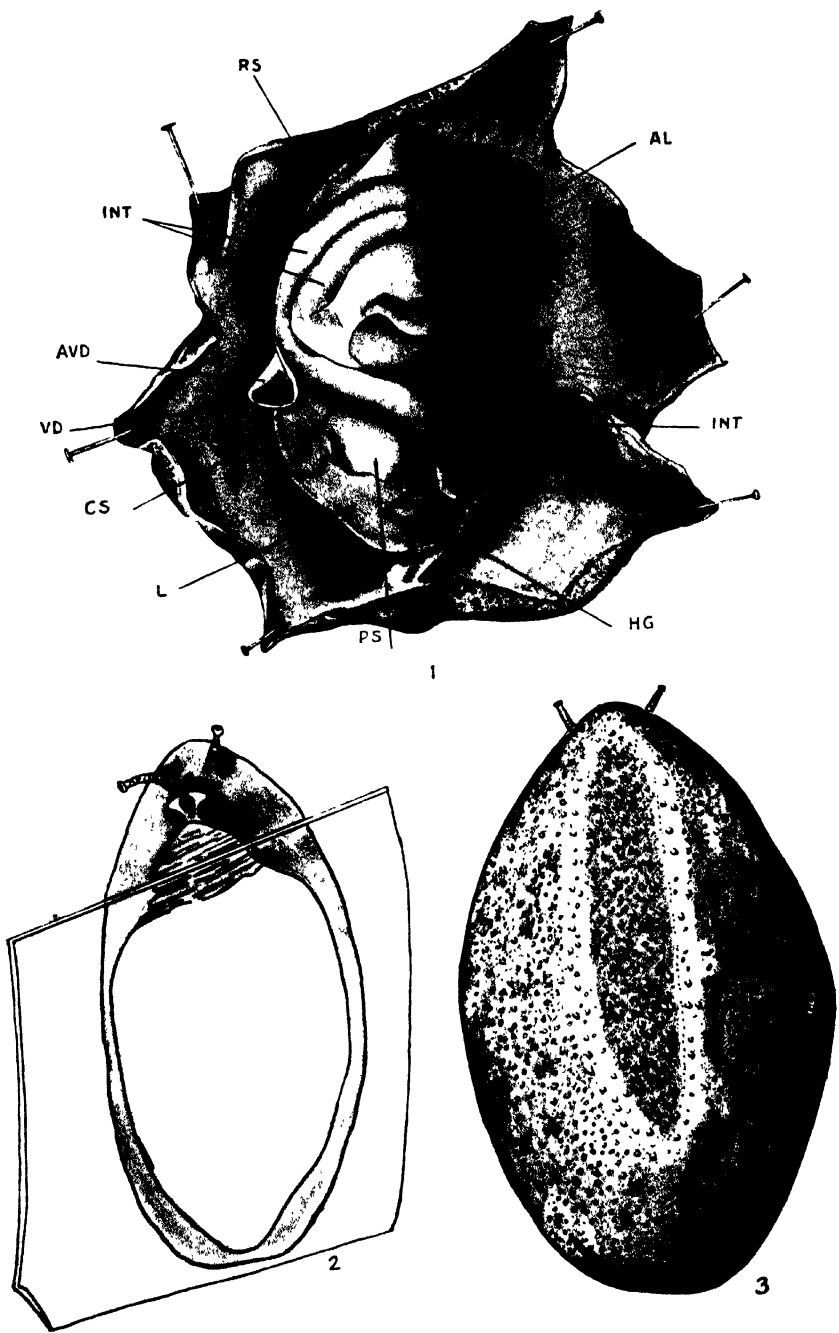
? *Onchidium planatum* (*Quoy and Gaimard*), *Tapparone Canefri*, *Loc. cit.*

Obs.—A short note in Italian gives no specific data of this species.

Locality.—Wokan, Aru Island.

EXPLANATION OF PLATE XXXVIII.

- Fig 1. *Oncis chameleon*, Brazier, opened from the dorsal surface: INT. loops of the intestine; RS. receptaculum seminis; AVD. ampulla of the vas deferens; CS. second stomach; L. lung; PS. posterior liver; AL. anterior liver; HG. hermaphrodite gland.
- Fig. 2. *Oncis chameleon*, Brazier, attached to a piece of clear glass.
- Fig. 3. *Oncis chameleon*, Brazier, from a specimen 38 mm. in length.



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A REVIEW OF THE AUSTRALIAN TUN SHELLS

BY

CHARLES HEDLEY, Assistant Curator, Australian Museum.

(Plates xxxix-xliv.)

For a century Lamarck's name of "*Dolium*"¹ dating from 1801 has been employed for the Tun shells. But Mörch² pointed out that *Tonna* of Brunnich, proposed in 1772, to say nothing of *Cadus*, Bolten, introduced in 1798, had precedence and this improved nomenclature is now generally adopted.

Tun shells are among the largest of Gasteropods, the huge "Beer-barrel" from New South Wales is now recorded with a capacity of four and a quarter pints and a length of nearly ten inches. But this size is exceeded by that of a giant from Sicily, mentioned by Philippi³, which had a length of eleven inches.

For various reasons, not much critical examination has been bestowed on the Tun Shells. Specimens do not often occur on the beaches, the bulk of some is inconvenient for ordinary collections and yet their wide range of variation demands a large series for satisfactory study. None have yet been recorded from the coasts of Tasmania or Victoria, though this deficiency will probably be remedied when the deeper waters of those States are searched. The appearance of an unknown species from this coast has induced the writer to examine the series in the Australian Museum and to offer the following review.

In an analysis of the Australian species, the tropical *T. perdis*, for which Montfort⁴ created a genus, *Perdrix*, may be distinguished by its slender form and with it may be grouped *T. caudiculata*. The remainder may be divided into those with a toothed and reflected lip, viz.:—*T. costata*, Menke, *T. parvula*, Tapparone Canefri, and *T. sulcosa*, Born, and those with a sharp simple lip:—*T. ampullacea*, Philippi, *T. cerevisina*, Hedley, *T. cumingii*, Reeve, *T. picta*, Schepman, *T. tetracotula*, Hedley, and *T. variegata*, Lamarck. In the latter group there is a colour scheme which oscillates from spots to bands.

In 1847, when in H.M.S. "Rattlesnake," the veteran collector John MacGillivray gathered a larval mollusc a little to the south of Cape Byron, New South Wales, which he described⁵ in a letter to his friend, Prof. E. Forbes. This was afterwards called *Macgillivrayia pelagica*⁶, and types of it are preserved in the Royal Scottish Museum, Edinburgh. Subsequently Dr. Paul Fischer⁷ classified *M. pelagica* as a *Dolium*. It would not be wise to attempt to identify this larval shell with any particular species of the genus. The admission⁸ of *Tonna perdis* to the fauna of New South Wales as a synonym of *M. pelagica*, following Dr. Fischer is regretted.

¹ Lamarck—Syst. Anim. sans Vert., 1801, p. 79.

² Mörch—Malak. Blatt., xviii., 1871, p. 16.

³ Philippi—Moll. Siciliæ, i., 1836, p. 219.

⁴ Montfort—Conch. Syst., ii., 1810, p. 447.

⁵ MacGillivray—Ann. Mag. Nat. Hist. (2), ii., 1848, p. 31.

⁶ MacGillivray—Voy. Rattlesnake, i., p. 45, ii., 1852, p. 383, pl. iii., fig. 8.

⁷ Fischer—Journ. de Conch., xi., 1863, p. 149.

⁸ Hedley—Journ. Roy. Soc. N.S.Wales, li., 1918, p. M 68.

TONNA AMPULLACEA, *Philippi*.

(Plate xliv., fig. 7.)

Dolium ampullaceum, Philippi, Zeitschr. malak., ii., 1845, p. 147. *Id.*, Philippi, Abbild. Besch., iii., 1849, p. 11, pl. ii. *Id.*, Kuster, Conch. Cab., 1857, p. 68, pl. lx. *Id.*, Hanley, Proc. Zool. Soc., 1859, p. 491. *Id.*, Dunker, Novitat. Conch. Mar., 1867, p. 105.

Tryon has reduced this to a synonym of *T. costata*, but the larger size, simple lip and intermediate riblet of *T. ampullacea* seem to me to support Philippi's judgment of its independence. I cannot find that a definite locality has ever been recorded for this rare species. So the following record of an imperfect example 130 mm. in length obtained by Messrs. J. W. Christie and Godfrey, is of interest.

Loc.—Point Charles, Port Darwin, Northern Territory (rare).

TONNA CEREVISINA, *n. sp.*

(Plates xxxix-xli., figs. 1-3.)

Dolium variegatum, Reeve, Conch. Icon., v., 1849, pl. v., fig. 7a. *Id.*, Angas, Proc. Zool. Soc., 1867, p. 197. *Id.*, von Martens, Forsch. Gazelle, iii., 1889, p. 263. *Id.*, Melvill & Standen, Journ. Linn. Soc., Zool., xxvii., 1899, p. 164. *Id.*, Roth, Bull. N. Queensland Ethnography, iii., 1901, p. 18. *Id.*, Hedley, Mem. Austr. Mus., iv., 1903, p. 341.

Tonna variegata, Hedley, Proc. Linn. Soc. N.S.Wales, xxxii., 1907, p. 483 (not *Dolium variegatum*, Lamarck).

Shell globose, of great size but comparatively light and thin. Whorls five plus a turbate, horny protoconch of three whorls.

Colour.—The young shell is buff or cream, often with three or four pale bands each as broad as one or two of the ribs, large dashes of burnt sienna are irregularly disposed, they are restricted to the paler bands and do not transgress from the rib to the groove, these spots vary in number and distribution, being most frequent on the spire, on the side of the shell the spots may be crowded till spaced by their own width, or they may be scattered at the rate of four or five to a whorl, they become more rare in the adult, which on a buff ground is usually streaked and clouded with shades of chocolate and cinnamon. The epidermis is thin, membranous and rather persistent.

The ribs are seventeen to twenty in number, the topmost usually double, six ribs continue on the spire, and generally the ribs are broad and flat-topped with narrow interstices, exceptionally the ribs are narrower and more round-backed and are then parted by grooves as wide as the ribs; sometimes the ribs are obliquely malleated.

Aperture ample, semi-lunate; outer lip simple; inner lip a thin smear of callus. Interior corrugated by the impress of the external ribbing, hazel or rufous in colour. Columella twisted above, perpendicular below, broadly reflected over a wide spiral umbilicus, beyond which is a prominent funicle. Canal short, up-turned with a wide, oblique, U-shaped notch.

Length, 240 mm., major diameter, 210 mm., minor diameter, 160 mm. Weight, one pound, two ounces. Capacity, four and a quarter pints.

Probably *Dolium marginatum*, Philippi and *D. reevei*, Hanley, are related to the species under discussion but the figures of those species do not admit of serviceable comparison.

Loc.—The type specimen was taken by Mr. J. Brazier in mud from 13 fathoms off George's Head, Port Jackson. The "Thetis" took it outside the Heads in depths down to 66 fathoms. From Queensland it has been reported from Moreton Bay (Gazelle), Mast Head Island (Hedley), Cape Grafton (Roth), and Torres Strait (Haddon).

TONNA CEREVISINA, *var. HAURAKIENSIS, var. nov.*

Tonna variegata, Suter, Manual N.Zealand Mollusca, 1913, p. 314, pl. xlvii. (not *Dolium variegatum*, Lamarck).

Compared to the typical form from Sydney, this is a thinner shell, smaller and more oval; that is with a higher spire and a diameter less in proportion to height.

A specimen trawled January, 1919, in the Hauraki Gulf, by the Municipal Fishing-boat "Cowan" has five whorls, exclusive of the proto-conch, a height of 185 mm., major diameter 132 and a minor diameter of 110 mm.

Loc.—North of Tauranga (North Island), New Zealand.

TONNA CUMINGII, *Reeve.*

Dolium cumingii, Reeve, Conch. Icon., v., 1849, pl. viii., fig. 13b, 13c (not 13a). *Id.*, Kuster, Conch. Cab., 1857, p. 77, pl. lxiv., fig. 2. *Id.*, Hanley, Proc. Zool. Soc., 1859, p. 491. *Id.*, Kobelt, Jahrb. deut. malak. Gesell., ii., 1875, p. 265. *Id.*, Smith, Proc. Zool. Soc., 1891, p. 412. *Id.*, Hidalgo, Revist. R. Acad. Ciencias, i., 1904, p. 370.

Dolium olearium *var. cumingii*, Tryon, Man. Conch., vii., 1885, p. 262. *Id.*, Melvill & Standen, Proc. Zool. Soc., 1901, p. 385.

Dolium testardi, Montrouzier, Journ. de Conch., xi., 1863, pp. 75, 166, pl. v., fig. 6.

The picture by Reeve of this species is not satisfactory. By examination of the specimens in the Macleay Museum, I find that the record of *Dolium chinense* from Queensland by Mr. Brazier⁹ is based on this species. A specimen from Port Stephens corresponds well to Montrouzier's excellent figure. The small dints on the ribs are useful specific recognition marks.

Loc.—Cape Grenville and Low Island (Chevert Expedition); Wide Bay (Smith); Moreton Bay, Queensland (Hargraves coll.); Port Stephens (Brazier); and Broken Bay, New South Wales (Hargraves coll.).

⁹ Brazier—Proc. Linn. Soc. N.S.Wales, i., 1877, p. 234.

TONNA PICTA, Schepman.

Dolium pictum, Schepman, Notes from the Leyden Museum, xv., 1893, p. 276 (Not *Dolium lutesculatum*, var. *picta*, Hanley, Proc. Zool. Soc., 1859, p. 489).

This unfigured species has, naturally, not been again recognised. It is described as near *D. dunkeri*, Hanley, spotted on the earlier whorls with white and brown, on the later whorls irregularly streaked, sculptured with hair like striæ and twenty-three ribs. Size 56 x 43 mm. The type is in the Leyden Museum.

Loc.—? New Holland (Schepman).

TONNA TETRACOTULA, *sp. nov.*

(Plates xlii.-xliii., figs. 4-5.)

Shell large, ovate-globose, rather solid. Spire conical, rather elevated. Whorls five, plus a three-whorled horny protoconch; after the second whorl, the suture runs in a continuously deepening trench.

Colour.—Ground colour white to pale orange, often uniform but sometimes three spiral bands of hazel brown are more or less developed, the uppermost sometimes ascending the spire, each may cover a rib and one or both of the adjoining furrows, they are apt to be evanescent on the back of the last whorl and they may be entirely absent; when the apex is worn it appears blackish brown. The interior is white stained with cinnamon. The surface of the shell is glossy, the whole corded with nineteen to twenty-one (not counting the interstitial riblets) rather elevated ribs, four or five of which ascend the spire; those on the base are narrow and closer than the others; on the fourth and fifth whorls an interstitial riblet appears in each main groove of the upper half of the shell.

Aperture ample, semilunate; outer lip simple, inner lip a smear of callus. Throat corrugated by the external imprint of the ribs. Columella vertical, smooth, reflected over a narrow spiral umbilicus. Snout twisted, spirally grooved and decussated by growth striæ. Canal notch not produced.

Height (of type), 198 mm., major diameter, 150 mm., minor diameter, 117 mm. Another specimen, 187; 150; 105 mm. Weight eight ounces, capacity two pints.

This species seems to be a representative of *T. fasciata*, from which *T. tetracotula* differs by much larger size, more globose form and by the riblet which runs between the major ribs on the shoulder of the shell. Besides in *T. fasciata*, the lip is sharply reflected and denticulated and the first adult whorl has a reticulated sculpture caused by radiating threads absent in *T. tetracotula*.

Loc.—Off Green Cape, New South Wales, 40 to 80 fathoms.

TONNA VARIEGATA, Lamarck.

(Plate xliv., fig. 6.)

Dolium variegatum, Lamarck, An. s. vert., vii., 1822, p. 261. *Id.*, Blainville, Dict. Sci. Nat., xxiv., 1829, p. 502. *Id.*, Kiener, Coq. Viv., 1835, p. 9, pl. ii., fig. 3. *Id.*, Menke, Moll. Nov. Holl., 1843, p. 22. *Id.*, Hanley, Proc. Zool. Soc., 1859, p. 490.

Tonna variegata, Verco, Trans. Roy. Soc. S.Austr., xxxvi., 1902, p. 216 (not *D. variegatum* of Philippi, Reeve, Tryon or Angas).

Dolium kieneri, Philippi, Abbild. Besch., iii., 1847, p. 36.

This, which Peron collected in Shark Bay, Western Australia, was the first to be reported from this Continent, but its name and identity has been involved in much confusion. Lamarck in 1822 completed by dictation, being overcome by blindness, his history of invertebrate animals. Here he introduced Peron's shell under the name of *Dolium variegatum*. He said that it had a short spire, that the ribs were close and round backed, some red, others white, the white ones tessellated with red spots and that the length was two inches eight lines.

In 1835, Kiener figured as from the Lamarckian Collection and as *D. variegatum*, two dissimilar shells, *Dolium*, Plate ii., figs. 3 and 3a. Observing this discrepancy, Philippi in 1845 proposed the name of *Dolium marginatum* for Kiener's figure 3a. He continued in 1847, by stating that the remaining figure 3 was not in accord with Lamarck's description and distinguished it as a new species, *Dolium kieneri*. In support of this contention he presented original figures¹⁰ of a shell that he conjectured to be the real *D. variegatum*. These figures so closely resemble the type figures of *D. chinense*, Dillwyn¹¹, that I suggest their identity.

Probably the figures of Kiener are considerably reduced and since the count of ribs in front differs from behind, are also a little inaccurate, the basal funicle is curved more like that of *Dolium testardi*, Montrouzier, than like that of the shell here named *variegata*.

Philippi's conclusions were not accepted by subsequent writers; Reeve in 1849 figured for *Dolium variegatum* two different forms, neither of which agreed with Kiener's or with Philippi's meaning of Lamarck's species. Tryon in 1885 considered that *Dolium variegatum* and *D. chinense* were varieties of one species. So that by different authors, at different times, at least five different forms have been called *Dolium variegatum*.

Only reference to the Lamarckian type, now probably in the Geneva Museum, can decide what *D. variegatum* really is. Meanwhile, as a working hypothesis, I assume that Lamarck based his species on a half-grown individual of a common Western Australian form; that Kiener figured, though not very accurately, the real *D. variegata* as his fig. 3. Consequently I regard *D. kieneri* as a synonym of *D. variegatum*. But whichever view be taken of the identity of *D. variegatum*, it is improbable that Reeve was correct in embracing a giant species from New South Wales under that name.

In the adult state, size alone will distinguish the species from Western Australia and that from New South Wales. A specimen of *Tonna variegata* of four and a half whorls is 95 mm. long, while one of that now called *T. cerevisina* of four and a half whorls is 170 mm. long. Besides *T. variegata* is narrower in proportion to height and carries on the upper half of the whorl an interstitial riblet in each groove, that is absent in *T. cerevisina*.

¹⁰ Philippi—Abbild. Besch., iii., 1847, pl. i., figs. 2a, 2b.

¹¹ Chemnitz—Conch. Cab., xi., 1795, pl. clxxxviii., figs. 1804, 1805.

In young stages the species are more difficult to discriminate, but apart from the proportion of size to number of whorls, *T. variegata* has the ribs a little closer and higher and the colour inclines to an orange tone.

The possibility is not excluded that a complete geographical series from tropical Australia may in future link by intermediate gradations the small *T. variegata* to the large *T. cerevisina*.

A shell from Western Australia figured for this species is rather solid, oval in shape, with an elevated spire. It has four and a half whorls, exclusive of the protoconch and is 92 mm. long, and 72 mm. broad. On a cinnamon ground there are four white bands carrying widely spaced chocolate spots. Two immature shells from the Irwin River mouth, Western Australia, have similar colouring. But another specimen from Geraldton, in the same State, is painted as in Kiener's figure.

Loc.—The type locality is Shark Bay, Western Australia.

TONNA COSTATA, Menke.

Dolium costatum, Menke, Synop. Meth. Moll. [1828, *vide* von Martens]; ed. 1830, p. 63, for Martini, iii., pl. cxviii., fig. 1082.

Dolium costatum, Deshayes (anew), An. s. vert., 2nd. ed., x., 1844, p. 144 for Kiener, Coq. Viv., pl. iv., fig. 6. *Id.*, Reeve, Conch. Icon., v., 1849, pl. v., fig. 8. *Id.*, Kuster, Conch. Cab., 1857, p. 61, pl. lvi., fig. 3, pl. lvii., fig. 3. *Id.*, Martens in Möbius, Faun. Mauritius, 1880, p. 264. *Id.*, Jack and Etheridge, Geol. and Palæont. of Queensland and New Guinea, 1892, p. 694. *Id.*, Pilsbry, Cat. Marine Moll. Japan, 1895, p. 171. *Id.*, Smith, Faun. Maldive Laccadive, 1904, p. 611. *Id.*, Schepman, Siboga Exped., Prosobranchia, 1909, p. 125. *Id.*, Odhner, K. Sven. Vet. Akad., vol. lii., 1917, p. 11.

Tonna costata, Shirley, Proc. Roy. Soc. Queensland, xxii., 1911, p. 98.

Dolium latesulcatum, Hanley, Proc. Zool. Soc., 1859, p. 489. *Id.*, Roth, North Queensland Ethnography, Bull., iii., 1901, p. 18.

Loc.—Torres Strait (Shirley); Annam River mouth and Green Island (Hedley); Cape Grafton, Queensland (Roth); Broome, Western Australia (Mjöberg).

TONNA PARVULA, Tapparone Canefri.

Dolium fimbriatum, Brazier, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 235.

Dolium fimbriatum var. *parvulum*, Tapparone Canefri, Bull. Soc. Zool. France, 1878, p. 257, pl. vi., fig. 4.

Tonna fimbriata, Shirley, Proc. Roy. Soc. Queensland, xxiii., 1911, p. 98 (not *Dolium fimbriatum*, Sowerby, Genera Rec. Foss. Shells, ii., 1827, pl. ccxlii., fig. 2).

Loc.—Murray Island, Queensland (Shirley).

TONNA SULCOSA, Born.

Buccinum sulcosum, Born, Index Mus. Caes. Vindob., 1778, p. 230 (vide Brauer, K. Akad. Wiss., lxxvii., 1878, p. 43). *Id.*, Born, Test. Mus. Caes. Vindob., 1780, p. 241. *Id.*, Dillwyn, Descr. Cat., ii., 1817, p. 584.

Buccinum fasciatum, Bruguière, Encycl. Meth., vers. i., 1789, p. 249 (not *Buccinum fasciatum*, Muller, 1774).

Cadus fasciatus, Bolten, Mus. Bolt., 1798, for Martini, iii., fig. 1081.

Dolium fasciatum, Lamarck, An. s. vert., vii., 1822, p. 260. *Id.*, Kiener, Coq. Viv., 1835, p. 11, pl. iii., fig. 5. *Id.*, Reeve, Conch. Icon., v., 1849, pl. vii., fig. 11. *Id.*, Kuster, Conch. Cab., 1857, p. 62, pl. lvi., fig. 4. *Id.*, Hanley, Proc. Zool. Soc., 1859, p. 489. *Id.*, Dunker, Index Moll. Mar. Jap., 1882, p. 57. *Id.*, Fischer, Cat. Moll. Indo-Chine, 1891, p. 68. *Id.*, Thurston, Madras Museum Bull., iii., 1894, p. 124. *Id.*, Hidalgo, Revist. R. Acad. Cienc., i., 1904, p. 370. *Id.*, Hirase, Illustr. Thousand Shells, No. 1, 1914, pl. v., fig. 19.

Loc.—Nickol Bay, Western Australia (Hargraves coll.).

TONNA PERDIX, Linne.

Buccinum perdix, Linne, Syst. Nat., x., 1758, p. 734. *Id.*, Hanley, Ips. Linn. Conch., 1855, p. 240 (cites Martini, Conch. Cab., fig. 1079 as typical).

Cadus perdix, Bolten, Mus. Bolt., 1798, p. 150.

Dolium perdix, Lamarck, An. s. vert., vii., 1822, p. 261. *Id.*, Quoy and Gaimard, Voy. Astrolabe, Zool., ii., 1833, p. 598, pl. xli., figs. 1-8 (animal from life). *Id.*, Troschel, Gebiss der Schnecken, i., 1863, p. 226, pl. xix., fig. 3 (radula). *Id.*, Dunker, Index Moll. Mar. Jap., 1882, p. 58. *Id.*, Watson, Chall. Exped., Zool., Rep. xv., 1886, p. 412. *Id.*, Melvill & Standen, Journ. Linn. Soc., Zool., xxvii., 1899, p. 164. *Id.*, Schepman, Siboga Exped., Prosobranchia, 1909, p. 230.

Tonna perdix, Oliver, Trans. N.Z. Inst., xlvii., 1914 (1915), p. 529.

Perdix reticulatus, Montfort, Conch. Syst., ii., 1810, p. 446.

Loc.—Dirk-Hartog Island, Shark Bay, Western Australia (Quoy and Gaimard); Torres Strait (Haddon); Green Island, Queensland (Hedley).

TONNA PERDIX var. RUFA, Blainville.

Dolium rufum, De Blainville, Dict. Sci. Nat., liv., 1829, p. 503. *Id.*, Hanley, Proc. Zool. Soc., 1859, p. 492.

Loc.—? Australasia (Blainville).

TONNA CANALICULATA, Linne.

Bulla canaliculata, Linne, Syst. Nat., x., 1758, p. 727. *Id.*, Mus. Ulricae, 1764, p. 588. *Id.*, Hanley, Journ. Linn. Soc., iv., 1860, p. 67.

Buccinum olearium, Bruguière, Encycl. Meth., vera, i., 1792, p. 243 (not *Buccinum olearium*, Linn. Syst. Nat., x., 1758, p. 734).

Dolium olearium, Quoy and Gaimard, Voy. Astrolabe, Zool., ii., 1833, p. 600, pl. xli., fig. 9 (animal from life). *Id.*, Deshayes, An. s. vert., x., 1844, p. 140. *Id.*, Morch, Cat. Conch. Kierulf., 1850, p. 13. *Id.*, Schmeltz, Cat. Godeffroy Mus., iv., 1869, p. 97. *Id.*, Langdon, Jouru. of Conch., i., 1875, p. 73. *Id.*, Martens in Mobius, Faun. Mauritius, 1880, p. 264. *Id.*, Smith, Proc. Zool. Soc., 1891, p. 412. *Id.*, Thurston, Bull. Madras Mus., iii., 1895, p. 124. *Id.*, Martens, Rumphius gedenkboek, 1902, p. 117. *Id.*, Smith, Faun. Maldive Laccadive, ii., 1904, p. 611. *Id.*, Schepman, Siboga Exped. Prosobranchia, 1909, p. 125. *Id.*, Odhner, K. Sven. Vet. Akad., Vol. lli., No. 16, 1917, p. 11.

Cadus cepa, Bolten, Mus. Bolt., 1798, p. 150.

Dolium cepa, Hanley, Proc. Zool. Soc., 1859, p. 489.

The type of this species should be in the Uppsala Museum, Sweden. Hanley announced in 1859 his discovery that the Linnean *B. canaliculata* was what almost all conchologists had erroneously called *Dolium olearium*, and that the real *Buccinum olearium* was that Japanese species which Philippi had so beautifully figured¹² as *Dolium crenulatum*. Zoologists have since been deaf to Hanley's remarks.

This common Oriental shell called the "onion-peel" by the French, has not hitherto been recorded from Eastern Australia.

Loc.—Broome, Western Australia (Mjöberg) and Trinity Bay, Queensland (Austr. Mus. Coll.).

¹² Philippi—Abbild. Besch., iii., 1847, *Dolium*, pl. i., fig. 1.

EXPLANATION OF PLATE XXXIX.

Fig. 1. *Tonna cerevisina*, Hedley. From the type, an almost uniform brown shell, with five adult whorls in a length of 240 mm., taken in 13 fathoms in Sydney Harbour.



Fig. 1

EXPLANATION OF PLATE XL.

- Fig. 2.** *Tonna cerevisina*. A specimen banded with brown and white with spots which are restricted to the pale belts. Four and three quarter whorls in a length of 185 mm. From 40-80 fathoms off Green Cape, New South Wales.

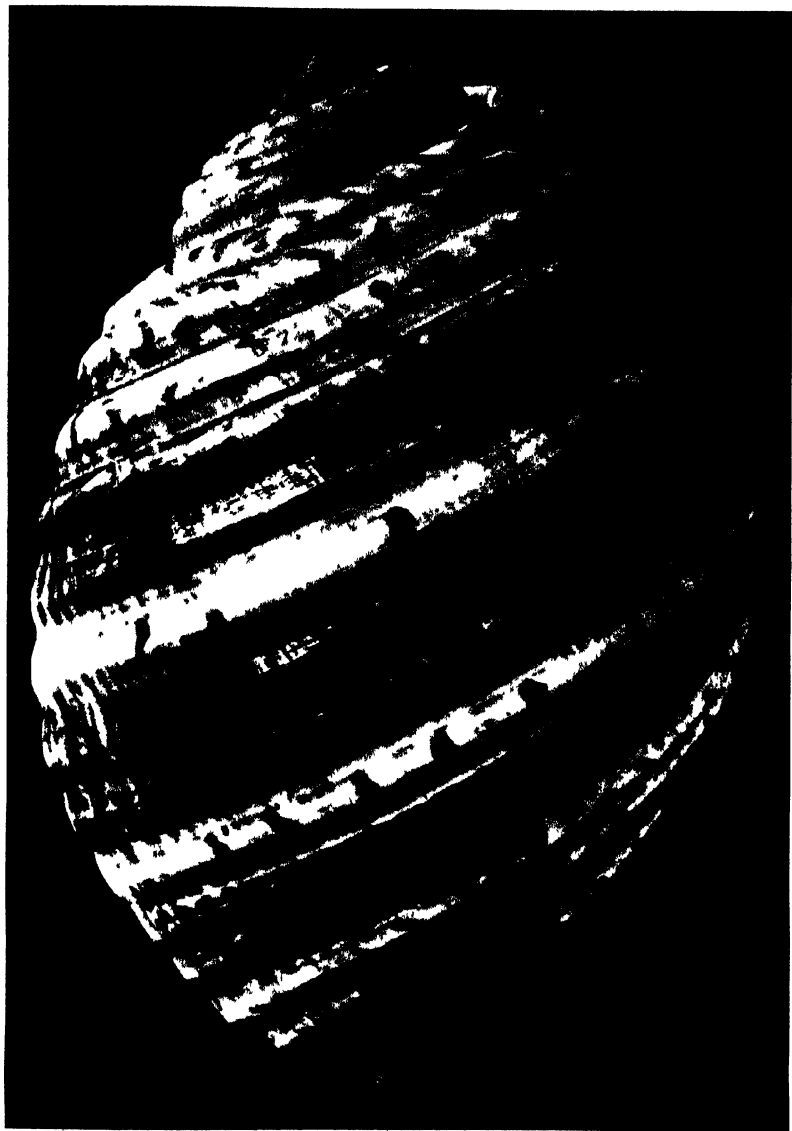


Fig. 2

C. CUTTON, photo, Austr. Mus.

EXPLANATION OF PLATE XLI.

- Fig. 3. *Tonna cerevisina*. A specimen without any brown bands and with spots uniformly distributed. Four adult whorls in a length of 130 mm. From 40-80 fathoms off Green Cape, New South Wales.

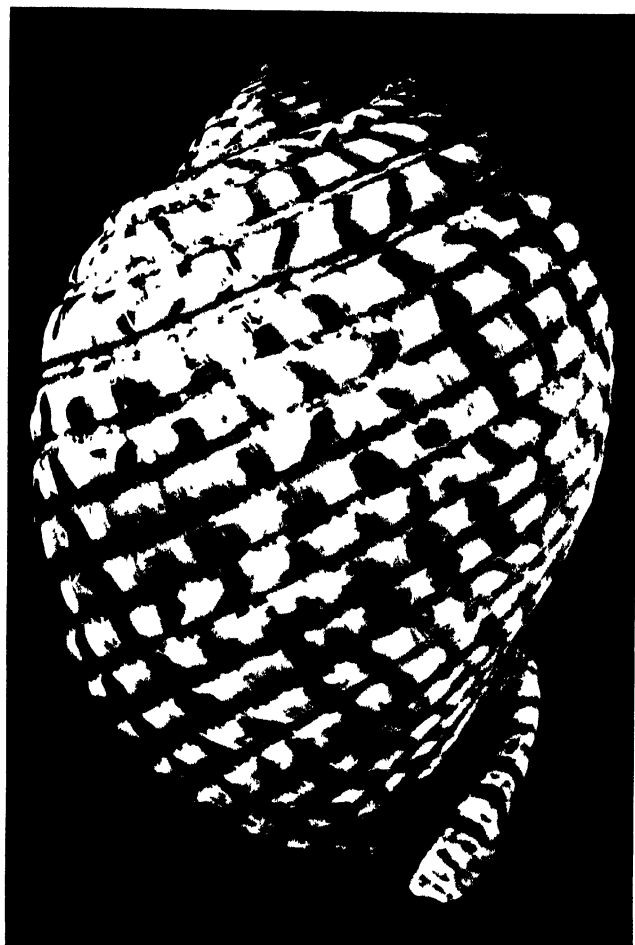


Fig. 3

EXPLANATION OF PLATE XLII.

Fig. 4. *Tonna tetracotula*, Hedley. From the type, which has five adult whorls in a length of 198 mm. From 40-80 fathoms off Green Cape, New South Wales.

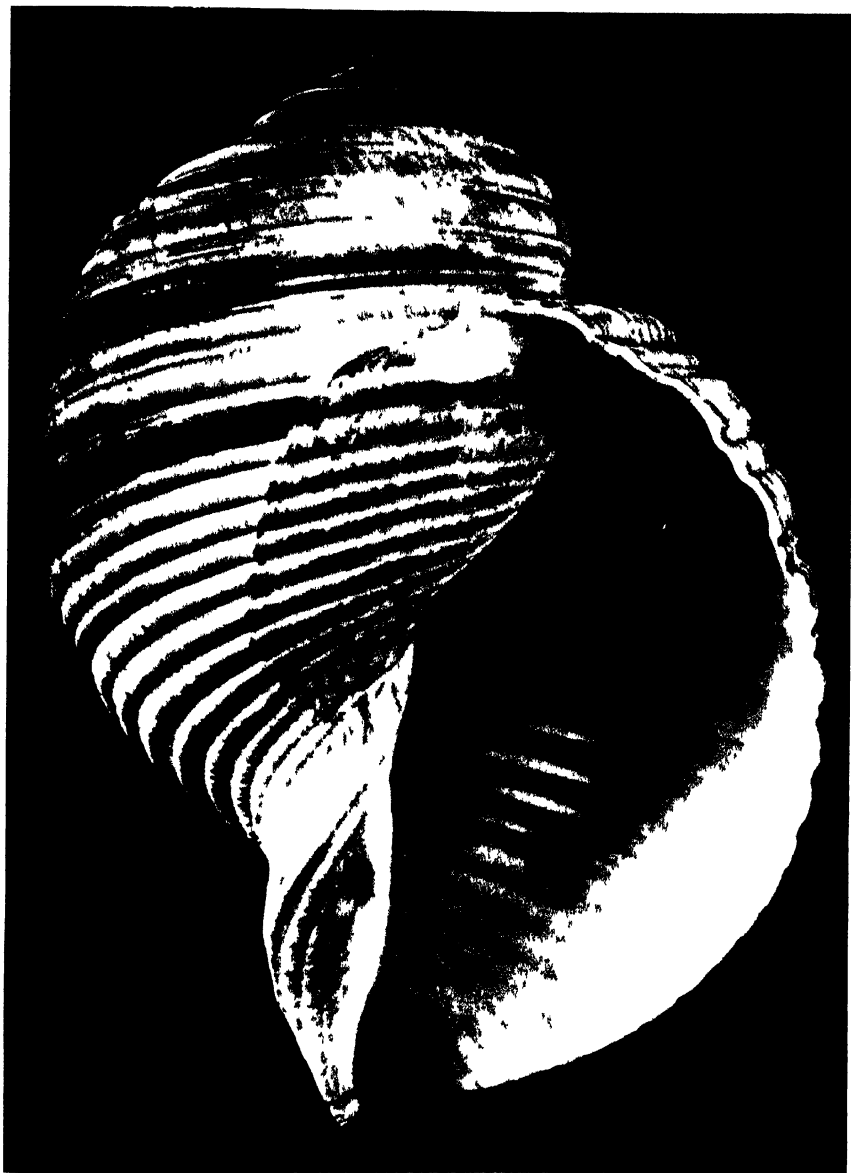


Fig. 4

EXPLANATION OF PLATE XLIII.

Fig. 5. *Tonna tetracotula*, Hedley. Dorsal view of another specimen similar in size and locality.

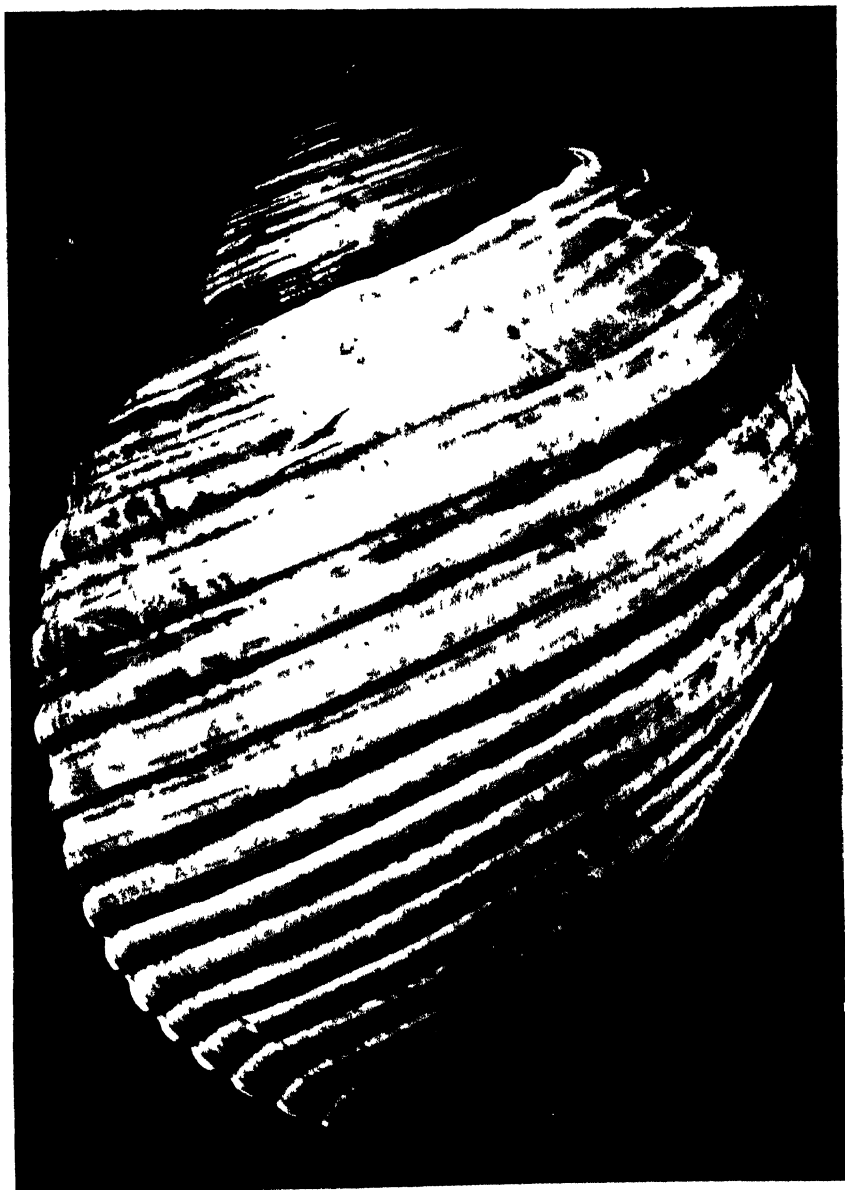


Fig. 5

C. C. UTTON, photo, Austr. Mus.

EXPLANATION OF PLATE XLIV.

- Fig. 6. *Tonna variegata*, Lamarek. A specimen having four and a half whorls in a length of 92 mm. from Western Australia.
- Fig. 7. *Tonna ampullacea*, Philippi. A broken specimen from Port Darwin, approximately 130 mm. long.

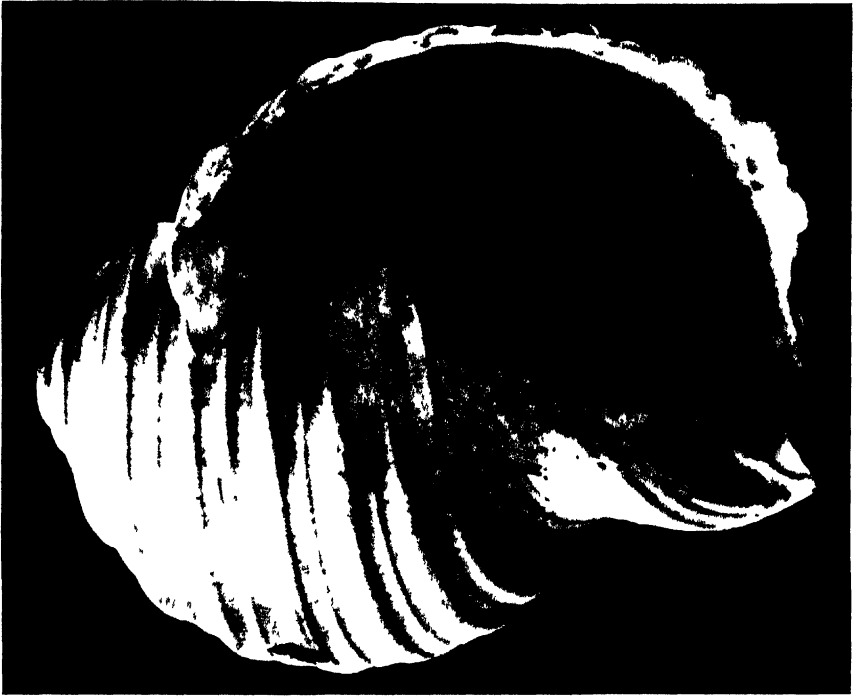


Fig. 7



Fig. 6

OCCASIONAL NOTES.

I.—THE MALE GALAPAGOS TORTOISE (*Testudo nigrita*) FORMERLY AT GLADESVILLE, SYDNEY.

Through the courtesy of the Council of the Zoological Society of New South Wales, I was permitted to make extracts from the old Minute Books of the Society in connection with facts relating to the acclimatisation of certain animals and birds. By this means I am able to fill a gap in Mr. E. R. Waite's history¹ of the Male Gladesville Tortoise.

Mr. Waite records the arrival of the Tortoise in Sydney from Tonga, apparently in 1866, and recounts its presentation to Mr. Alexander MacDonald by King George of Tonga. "From 1866 to the end of 1896 the tortoise lived in Sydney, and at the latter date was removed to England."

Now a newspaper cutting attached to the minutes of the Society of the 3rd October, 1884, record the following facts:—

"The reception yesterday at the grounds of an enormous land tortoise, supposed to be one of the largest, if not the largest in the world. It is sent by Mr. Alexander MacDonald, of Potts Point, a member of the firm of MacDonald, Smith & Co., of Hunter Street, to whom it was presented 20 years ago by King George of Tonga, when its age was estimated, in Tonga, at upwards of 200 years. It weighs 5 cwt., 2 qrs., 26 lbs., length from nose to tail 6 feet, 2 inches; girth 8 feet, 3 inches. There has been a larger specimen of tortoise known, one weighing 870 lbs.; but that is now enshrined among the other stuffed natural wonders in the British Museum" (Minutes, 3rd October, 1884).

On the 16th January, 1885, the Secretary reported the Tortoise removal by Mr. MacDonald, on 7th January, either back to Potts Point or to Gladesville.

It will be noted that the measurements given above and those afforded both by Dr. J. C. Cox² and Mr. Waite are precisely the same.

R. ETHERIDGE.

¹ Waite—Bec. Aus. Mus., iii., 5, 1899, p. 95.

² Cox—Proc. Linn. Soc. N.S. Wales, viii., 4, p. 532.

THE AUSTRALIAN MUSEUM:—
FRAGMENTS OF ITS EARLY HISTORY¹.

BY

R. EIDERIDGE, JUNR., Director and Curator.

(Plates xlv.-xlix.)

In the first part of these "Fragments" were detailed the Inception, Title, and Names of the Earliest Curators. In the present part will be found related the wanderings to and fro of the Collections from the first record I have to their arrival at their present home in College Street in 1849.

3. WANDERINGS OF THE INFANT COLLECTIONS.

It will be remembered I traced back the Museum's history to practically 1827 as the "Colonial Museum." One may safely assume this was the "beautiful collection" in charge of Mr. W. Holmes² possibly in the Judge Advocate's Old Office judging by an article in the "Sydney Gazette" of 1830³ :—

"The Sydney Museum [another early name for the institution], kept for the present in the old Judge Advocate's Office, has just received from the out-stations some valuable additions to its stock of curiosities."

This is the first direct reference, other than those already detailed, I have met with. What the relation of the foregoing office to the next location, the "Old Post Office," referred to in the "Sydney Gazette" of 1830³, was I am not certain. But first which of the Old Post Offices is here referred to? That in George Street (then called High Street) about the site of the present Metropolitan Fire Brigade building at Circular Quay; or the second on the King's Wharf, opposite the Paragon Hotel, Circular Quay⁴; or the third in Bent Street⁵, at the rear of the present Education Department building? In all probability the last named, for in "The New South Wales Calendar and General P.O. Directory" for 1832⁶, there occurs in a list of public offices and buildings amongst other items :—"Museum, Bent Street," but in 1833 edition of the same publication, this is not repeated. Mr. Hugh Wright, of the Mitchell Library, informs me the Judge Advocate's Old Office "was in what is now Loftus

¹ Continued from "Records," Vol. xi., No. 4, 1916, p. 67.

² Sydney Gazette, xxviii., 1830 (6th Feby.), No. 1772.

³ Sydney Gazette, xxviii., 1830 (31st Aug.)

⁴ Houston—"History of the G.P.O., etc., in N.S.W., 1890," pp. 3, 7 (*vide* H. Wright).

⁵ Bent Street—up to 1810 was without a name. In the "Sydney Gazette" of 1810 (viii., 1810 (Oct. 6th), No. 353) is a "Plan of the New and Old Names of Streets, etc., in the Town of Sydney, with Explanations and References." The New Street under the name of Bent Street is described as "extending from Spring-row in an easterly direction to the fountain, and thence to the north end of Phillip-street."

⁶ N.S. Wales Calendar and G.P.O. Directory, 1832, p. 26.

We can only conclude that with the removal of the Subscription Library to Bridge Street in May, 1836, to a house then recently vacated by the Chief Justice, also went the infant Museum from the following expression of Bladen's :—

"The premises in Bridge-street, occupied by the Library and Museum, were ordered to be vacated to accommodate the Surveyor-General and his Staff; rooms being provided for the Library at a building in Macquarie-street, opposite the site on which the Sydney Mint now stands." ¹⁵

This only accounts for the Library, what became of the Museum? These lengthy extracts from Mr. Bladen's interesting account render it clear that the conjoint Colonial Museum's collections and Subscription Library must have come together in Bridge Street, one from the Judge Advocate's Old Office in Bent Street, and the other from the Old Post Office in George Street, jointly occupying the house variously referred to as the Chief Justice's [Sir F. Forbes] and the office of the Surveyor-General. Hence they migrated together to the building in Macquarie Street, opposite the present site of the Royal Mint, and here their partnership ultimately ended. It has been stated that the Museum occupied "a small room attached to the Legislative Council¹⁶," but like other of Fowles' statements, lacks confirmation, as I have been unable to find any evidence in support.

This Colonial Museum in the house of Chief Justice Forbes is referred to in the "Sydney Gazette" of 1836¹⁷ :—

"The two lower rooms of the late residence of Chief Justice Forbes are set apart for the purpose. They are being nicely fitted up with glass cases to suit the apartments. The selection of birds and beasts, etc., are well worth seeing, all of which are in the highest state of preservation and neatly arranged."

"It may be interesting to give a few facts about this house in Bridge Street. In the Dowling "Reminiscences"¹⁸, by Judge James S. Dowling (son of Chief Justice Sir James Dowling), occurs the following account :—

"Passing Government House, three buildings came in view on the left side of Bridge Street . . . All were Government property. The first was the Colonial Secretary's Office, but is now used by the Education Department, and before it now grow the celebrated two old fig trees . . . The central building is no more, what it was used as I forget. The third was the official residence of the Chief Justice."

As these buildings were as described soon after Judge J. S. Dowling's arrival in Sydney, as a lad, the "Reminiscences" must refer to about the year 1828¹⁹. From the same source we learn that Sir Francis Forbes was :—

"The only Chief Justice to whom was granted the privilege of living in a Government residence rent free . . . It stood in Bridge Street,

¹⁵ Bladen—*Loc. cit.*, p. 20.

¹⁶ Fowles—*Sydney in 1848* [1878], p. 88.

¹⁷ *Sydney Gazette*, xxxiv., No. 2875 (22nd Oct.).

¹⁸ Dowling—*Reminiscences of the late Judge (J. S.) Dowling*, Parts i and ii, *Old Times*, i., No. 2, 1903, p. 114, No. 3, 1903, p. 185.

¹⁹ Dowling—*Loc. cit.*, No. 2, p. 116.

and was only recently pulled down, and partly on its site has been erected the very handsome block of buildings for the Lands Department²⁰."

The building in Macquarie Street to which the Museum collections and the Subscription Library were removed in May, 1840, was:—

"well known to the old colonists as the Surveyor-General's (the late Sir T. L. Mitchell) office²¹."



FIG. 7.

"St. James' Parsonage. In which the Library was located from 1840-3," and also the Museum.

(After Bladen—Public Library of N.S.Wales. Historical Notes, 1906, p. 16.)

and according to Maclehoose was previously in the hands of the Collector of Inland Revenue²².

About this time, to be exact, on 12th August, 1841, the Rev. W. B. Clarke addressed a letter²³ to the Colonial Secretary (Honourable E. Deas Thomson) calling attention to:—

"insufficiency of accommodation in the apartments reserved for the Museum in the house lately vacated by the Surveyor-General," and "detriment accruing to the stuffed specimens to which they are exposed The apartments reserved in Macquarie Street are, in the opinion of the Committee, inadequate for the purpose of arrangement and reception."

The letter concluded by definitely asking for better accommodation to be provided. The return correspondence to the above is not before me,

²⁰ Dowling—*Loc. cit.*, No. 3, p. 190.

²¹ Dowling—*Loc. cit.*, No. 3, p. 188.

²² Maclehoose—Picture of Sydney, 1838, p. 84.

²³ Official Letter-book, i., p. 36.

but the above letter was followed by a second, dated 18th October, 1841²⁴, also written by Mr. Clarke, in which he said :—

"The only room in the Buildings in Macquarie Street suitable for the reception of the Museum is, at present, in the occupation of the Town-Surveyor's Department, the other rooms, as I had previously the duty of observing, being quite insufficient for the purpose."

The matter of the Town Surveyor's Office was finally settled by a letter from the Colonial Secretary (Hon. E. Deas Thomson), as recorded in the minutes of 1st Dec., 1841 :—

"The Secretary [W. B. Clarke] read a letter from the Colonial Secretary stating that the room applied for in the occupation of the Town Surveyor cannot be granted by His Excellency [Sir G. Gipps] for the use of the Museum."

In the "New South Wales Calender and General Post Office Directory" for 1837²⁵ there appeared the following, which at first sight, may seem a contradiction to a great deal that has gone before :—

"The Museum, Macquarie Place, is open daily (Sundays excepted) between the hours of 12 and 3."

The contiguity, however, of this Macquarie Place site and that in Bridge Street is sufficient to indicate them as one and the same; but if proof be needed the following advertisement²⁶ should be sufficient :—

Australian Museum.

Notice is hereby given, that the Australian Museum²⁷ having been removed to the house lately occupied by His Honor the Chief Justice, in Macquarie Place, is now open for Public Inspection on *Tuesdays* and *Fridays* between the hours of Twelve and Three.

By order of the Committee,

George Bennett,
Secretary.

Australian
Museum,
June 8th, 1836.

It is surprising how little care appears to have been exercised by local historians in earlier days. Thus, Fowles in his "Sydney in 1848²⁸," says that whilst the Museum occupied the two rooms in the Surveyor-General's Office, "Dr. Bennett resigned his office as Director in favour of Mr. William Sheridan Wall²⁹." It has already been shown in Part I how fallacious such a statement was. Fowles also says the Institution was founded in 1836³⁰.

The first Museum Catalogue was published in 1837. On the 20th September, 1837, the Sub-Committee resolved that :—

²⁴ Official Letter-book, i., p. 39.

²⁵ N.S.W. Calendar and G.P.O. Directory, 1837, p. 342.

²⁶ Sydney Gazette, vii., No. 226, 1836 (June 15th) p. 454; *Id.*, No. 227, (June 22nd) p. 472.

²⁷ Note the title.

²⁸ Fowles—Sydney in 1848 : illustrated by copperplate engravings of the principal streets, public buildings, churches, chapels, etc. (4to.)

²⁹ Fowles—*Loc. cit.*, p. 84.

³⁰ Fowles—*Loc. cit.*, p. 83.

"The Manuscript Catalogue of the Museum drawn up by the Secretary (Dr. G. Bennett) be printed and that tenders are to be received from the Atlas and Colonial Printing Offices³¹,"

five hundred copies to be the issue. It was not actually ordered to be set up in type until the 4th October, 1837, the tender of Mr. Tegg, of the Atlas Printing Office, being accepted. This Catalogue was entitled :—

"A Catalogue of the Specimens of Natural History and Miscellaneous Curiosities deposited in the Australian Museum, by G. Bennett³²."

and has long been out of print. It would appear that a further Catalogue was contemplated as soon after the appearance of Bennett's as 1842, for on the 12th May of that year a letter is recorded from the Colonial Secretary, Hon. E. Deas Thomson, stating that His Excellency [Sir George Gipps] agreed to print copies of the Catalogue, but "recommended its revision³³." This revision was carried out by Mr. (Sir) W. Macarthur, and here the matter seems to have ended.

During its early struggles the Museum appears to have possessed a rival in that of the Sydney Mechanics' School of Arts, established 23rd March, 1833³⁴, and said to have been "opened" in 1837³⁵. Meetings were at first held on Church Hill in the house "lately occupied by Captain Rossi³⁶." For the period, this collection must have contained many objects of interest and value, and amongst its various Curators appear the names of no less than Dr. (Sir) C. Nicholson, Arthur a'Beckett, James Dunlop, F.R.S.³⁷, and for its President, Major (Sir) T. L. Mitchell, Surveyor-General. The Museum contained zoological objects, phrenological busts, minerals, fossils, Grecian and other coins, models, etc.:—

"The establishment of a Museum was considered by the originators of this Institution as a subject scarcely secondary in importance to any contemplated in its design³⁸."

The first record of acknowledging donations to come under my notice appeared in 1838. On the 3rd October of that year the plate, and a proof therefrom, were submitted to the Sub-Committee for inspection and approved of³⁹. This system is still in vogue. Looking a little further ahead; it was resolved on the 30th July, 1853⁴⁰, that :—

"The circular letter conveying such vote of thanks shall be signed by the Chairman."

This was so far afterwards departed from that the Curator, or his representative for the time being, performed this, and it is so now. It was also customary for many years to forward lists of donations to the public press for acknowledgment in that way.

³¹ Minutes, 20th Sept., 1837.

³² pp. 36 (12mo., Sydney, 1837).

³³ Minutes, 12th March, 1842.

³⁴ Third Annual Report for 1835.

³⁵ Moore's Almanac and Hand Book for N.S.W. for 1832, p. 43.

³⁶ Raymond's N.S.W. Calendar and G.P.O. Directory, 1835, p. 418.

³⁷ Tegg's N.S.W. Pocket Almanac, 1840, p. 170.

³⁸ Annual Report for 1838 (1839), p. 16.

³⁹ Minutes, 3rd October, 1838.

⁴⁰ " 30th July, 1853.

We left the collection, variously alluded to as the "Colonial Museum," "Australian Museum," etc., located near the corner of what is now Macquarie and King Streets, in apartments spoken of by the Rev. W. B. Clarke in anything but flattering terms. From this point there is, unfortunately, a confusion of dates in the Museum's history, and misstatements in contemporary literature; all accounts, however, agree that the next move was to the "New Court House, Woolloomooloo," the present Criminal Court at Darlinghurst. Fowles, the author of "Sydney in 1848"⁴¹, says the removal to the Court House took place in 1840 in the following words;

"In the year 1840 Mr. Wall, under the instructions of the Committee, and at the request of the Governor, Sir George Gipps, again removed the Museum to apartments prepared for it in the Supreme Court Buildings at Darlinghurst"

Again, in "Tegg's New South Wales Pocket Almanac" for 1842 is a further error, in the following words —

"The Museum at present is at the New Court House, Woolloomooloo, but will shortly be removed to the apartments in Macquarie Street recently in the occupation of the Surveyor-General's Department and under the same roof with the Australian Subscription Library"⁴²

Maclehose gives a view⁴³ of this "New Court House" (as completed) on the New South Head Road, Sydney (Fig. 8)



FIG. 8

New Court House (as completed), South Head Road, Sydney.
(After Maclehose—"Picture of Sydney and Strangers' Guide in N.S.Wales for 1838," pl. opp p. 120.)

⁴¹ Fowles—Sydney in 1848, etc., p. 84.

⁴² Tegg's N.S.Wales Pocket Almanac for 1842, p. 153.

⁴³ Maclehose—Pictures of Sydney and Strangers' Guide in N.S.Wales for 1838, pl. opp. p. 120.

These errors are only equalled by the statement made in the 1890 "Guide to the Contents of the Australian Museum, etc."⁴⁴, that :—

"The Museum was soon afterwards removed to the Surveyor-General's Office in Bridge Street, where it remained till 1849, in which year it was again removed to its present site at the corner of William and College Streets."

That the removal did not take place to the Court House site in 1840 as stated by Fowles is proved from the following extracts from official documents. At the Committee meeting held on 4th August, 1841, it was :—

"Resolved that the Secretary [W. B. Clarke] communicate with the Colonial Architect respecting the removal of the Museum to more suitable apartments than those allotted for its use in the Surveyor-General's Office. The Secretary accordingly addressed a letter to Mr. Lewis [Colonial Architect] to that effect."

Apparently no notice was taken of this request, for the minutes of 4th August, 1841, record a resolution almost in the same words as the above that the Secretary this time communicate with the Colonial Secretary direct :—

"Respecting the removal of the Museum to more suitable apartments than those allowed for it in the Surveyor-General's Office" [i.e., in Macquarie Street].

Evidently a little official energy manifested itself after this second appeal, for there is a copy of a letter extant⁴⁵ from Mr. Clarke to the Colonial Architect dated the 7th December, 1841, asking the latter to meet the Museum Committee at a date to be named :—

"At the Court House, Woolloomooloo, adjourning thence to the building in Macquarie Street."

The next letter⁴⁶ passing between the same parties, 20th December, 1841, leads one to believe that by this date the removal to the Court House was practically settled, for therein Mr. Clarke invited Mr. Lewis to meet the Committee on 23rd December :—

• "At the Museum in the New Court House."

It may, therefore, be taken for granted that the removal from the Surveyor-General's Office, near the corner of Macquarie and King Streets, to Darlinghurst took place some time very early in 1842. In fact, it is so stated in Tegg's Almanac for 1842⁴⁷, but as this is followed by the exploded story of subsequent removal again to Macquarie Street, too much reliance cannot be placed on it. Here Mr. W. Holmes' "beautiful collection" certainly remained until February, 1849. That it was there in 1848 is stated in Coleman's "Almanac"⁴⁸ for 1848 :—

⁴⁴ Sinclair—Guide to the Contents of the Australian Museum, 1890, p. 5.

⁴⁵ Official Letter-Book, i., p. 42.

⁴⁶ Official Letter-Book, i., p. 45.

⁴⁷ Tegg's N.S.Wales Pocket Almanac and Remembrancer for 1842, p. 153.

⁴⁸ Coleman's N.S.Wales Almanac and Remembrancer for 1848, p. 48.

"The Museum is at present at the New Court House, Darlinghurst, and is open for public inspection every Wednesday from 10 to 3. The Gardens daily from sunrise to sunset."

The Minutes of 26th August, 1848, record that the members of the Museum Committee were asked to examine :—

"Specimens of Natural History now in Court House previous to removal to the New Museum."

The permanent building in William Street, Hyde Park, having been pronounced sufficiently advanced to receive the collections, the removal, according to the Minutes, was ordered on 24th February, 1849⁴⁹, to be carried out :—

"Mr. Wall was authorised to proceed with the removal of the specimens of Natural History now in the New Court House, and to draw for the amount necessary to cover the expenses of their safe conveyance to the Museum. The sum not to exceed Thirty Pounds."

4—THE COMMENCEMENT OF THE AUSTRALIAN MUSEUM, AS WE KNOW IT, 1838-46, INCLUSIVE.

The Government of the day evidently had in view the erection of a permanent building to be devoted to the purpose of a Museum and Public Library as early as 1838, for in the Minutes of 1st August, 1838, we read :—

"The Colonial Architect [Mortimer W. Lewis] had been directed to confer with the Committee of the Australian Museum and the Australian Library for the purpose of proposing an eligible situation for the erection of an edifice suitable for these Institutions⁵⁰."

As the Collections have been traced to their permanent home, I now propose showing how that abode came into existence.

On the 25th September, 1844, Dr. [Sir] Charles Nicholson moved in the Legislative Council that an address be presented to His Excellency [Sir G. Gipps] asking that :—

"in furtherance of the object of the Right Honorable the Earl Bathurst, then Secretary of State for the Colonies, as communicated in His Lordship's Despatch to the Governor of this Colony, dated the 30th March, 1827, to cause some suitable apartments to be forthwith provided for the Australian Museum; or, if this be not practicable, to direct the Colonial Architect to prepare a plan, elevation, and estimate of a suitable building for the purpose to be laid before the Legislative Council for approval."

To this petition Sir George replied on the 27th of the same month⁵¹ :—

⁴⁹ Minutes, 24th February, 1849.

⁵⁰ Minutes, 1st August, 1838.

⁵¹ New South Wales, Votes and Proc. Leg Council, 1844, No. 65 (27th Sept. 1844) p. 243, "Message," etc.

Gentlemen,

I shall have much pleasure in giving directions to the Colonial Architect to prepare plans and Estimates of a Building to be erected for the Australian Museum.

George Gipps.

Government House,
Sydney, 27th September, 1844.

On the back of a separate copy of this reply, printed Government Gazette size, and now in the Mitchell Library, are a series of minutes, initialled "G.G.," one of which reads as follows⁵² :—

"Write to him [Colonial Architect] stating that I propose to place on the Estimates for 1846, a sum not exceeding £3,000 for the erection of a Museum, and request him to prepare a Plan of a Building suitable to the purpose. But before doing so, he should confer with the Committee of the Museum, both as to the nature of the Building to be erected, and the situation in which it should be placed. It seems to me, however; that it ought to be in the Botanic Gardens."

On 30th October, 1845, this sum was accordingly voted by Council :—

"No. 52."

"Votes and Proceedings of the Legislative Council, 30th October, 1845, p. 4."

"(53) Resolved, that a sum not exceeding £3,000 be appropriated towards erecting a Public Museum, at Sydney, for the year 1846."

And of which the Committee were duly informed as follows :—

Colonial Secretary's Office,
Sydney, 14th March, 1845.

Gentlemen,

An address having been presented to the Governor by the Legislative Council wherein His Excellency was requested to cause some suitable accommodation to be provided for the Australian Museum, I am directed to inform you that it is proposed to place on the Estimates for 1846, a sum not exceeding £3,000, for the erection of a Museum; and that the Colonial Architect has accordingly been desired to prepare a plan of a suitable Building for the purpose, first, however, conferring with you as to the nature of the Building to be erected, and the situation in which it should be placed.

His Excellency has, therefore, desired me to request that you will have the goodness to confer with the Colonial Architect on the subject.

I have the honour to be,

Gentlemen,

Your most obedient servant,

The Committee of
The Australian Museum.

for the Colonial Secretary,
W. Elyard, Junr.

The Committee in the interval were, no doubt, busy looking around for a site, for on the Minutes of 12th September, 1845, there occurs the following :—

"The unanimous opinion of the Meeting, that the portion of the Government House Demesne, east of the Library⁵³ and nearly opposite the Statue would be a very eligible situation."

⁵² 1844. New South Wales (Australian Museum). Ordered by the Council to be printed 27th September, 1844.

⁵³ This presumably means the present Public Library, the foundation stone of which was laid by the Honorable Alex. Macleay in 1844 (*Old Times*, i., No. 1, 1903, p. 21).

A deputation consisting of the Hon. Alexander Macleay, Dr. W. Dawson, and Mr. Lewis, was accordingly appointed to wait upon His Excellency.

The answer to this deputation was communicated to the Committee by a letter from the Colonial Secretary (The Hon. Deas Thomson) that His Excellency⁵⁴:—

“under the circumstances of His very probable, speedy departure from the Colony, he did not feel himself fully authorised to alienate any portion of the Lands now attached to the Demesne of Government House for any purpose whatever.”

As a set-off against this disappointment, however, the Colonial Secretary informed the Committee⁵⁵:—

“He had received His Excellency’s command to propose to their consideration that portion of land lying immediately to the north of the Sydney College⁵⁶.”

This offer was there and then accepted, with:—

“Their grateful sense of his attention to their wishes.”

It is interesting to note that this action on the part of Sir George Gipps seems to have been brought about by a suggestion emanating from Mr. S. A. Perry, Deputy Surveyor-General, in terms of the following letter, addressed by the latter to the former:—

Surveyor-General’s Office,
Sydney, 31st January, 1846.

Sir,

In attention to your letter of the 29th instant, No. 46/41; I have the honor to transmit to you herewith a tracing of the portion of Land situated at the corner of College Street, adjoining the allotment granted to the Sydney College, and which forms no part of the land belonging to Hyde Park, but from which it is distinguished as a reserve for Government purposes, and is consequently available for the object to which your letter refers. The area of the portion of land alluded to, as far as can be ascertained without a very minute survey, is two acres, two roods, and twenty perches, more or less. And I have further the honor to state that I am not aware of there being any objection to the appropriation of one acre of the Land for the purpose of erecting a Museum, reserving the remainder to be applied at some future period, and for which the position of the ground appears to me to be peculiarly eligible.

I have the honor to be,

Sir,

Your most obedient servant,

(Sgd.) S. A. Perry, D.S.

The area of the ground marked on plan may be granted as a site for a Museum, and the remainder of the land reserved, though without any pledge or promises as to the future appropriation of it.

(Sgd.) G. G.

February 3, 1846.

⁵⁴ Minutes, 18th November, 1845.

⁵⁵ Minutes, 28th January, 1846.

⁵⁶ Now the Sydney Grammar School. The site so occupied in 1880 formed part of the then Racecourse. The College was utilised for University purposes pending the opening of the latter in 1852. (Dallen—University of Sydney. Its History and Progress illustrated (4to. Sydney, 1914.) p. 7.)

The tracing accompanying this document had been lost when this letter first came under my notice, but fortunately another rough tracing (Fig. 9) to be referred to in the sequel as exhibiting additional land granted to the Committee, was found in the Museum archives. Here, on the original site of one acre is shown as "former site of Museum."

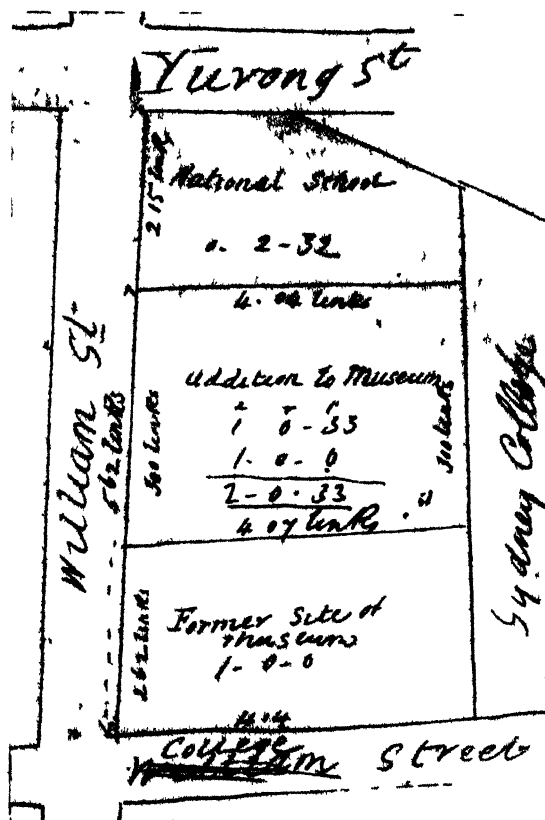


FIG 9

The site granted by His Excellency Sir George Gipps is thus referred to in the "Dowling Reminiscences," already mentioned. The wording of Miss Salmon's article is so similar I think these "Reminiscences" must have been the source from which she obtained her information; furthermore, both perpetuate the same mistake⁵⁹.

In an interesting article entitled "Old William-Street Interesting History," etc., by Miss Mary Salmon⁵⁷ we learn that —

"Where the Sydney Museum now stands in College-Street, was high ground that had a creek running along one side of it, where the boys fished for eels. The ground where the Grammar School, the Museum, and the Wilham-Street Public School stand⁵⁸ was the property of Chief Justice Forbes, and in it he had a fine garden, with a high brick wall that abutted on the Riley Estate"

⁵⁷ Evening News, February 18th, 1917.

⁵⁸ Yurong Street Public School.

⁵⁹ Dowling—Old Times, I., No. 2, 1903, p 117

"The ground [in 1822] where now stands the Museum, Grammar School, and the buildings facing College Street to its intersection with the Old South Head Road [Oxford Street] was enclosed by a brick wall, and I think was the property of the Chief Justice [Forbes], and by some was called his garden; the brick wall formed part of the western boundary of the Riley Estate."

A portion of this same ground referred to in the two previous quotations, that on which the Museum stands⁶⁰, is distinctly referred to in already quoted official documents (p. 350) as a "reserve for government purposes," consequently it could not have formed part of the Chief Justice's garden. Support is lent to this view by an old plan in the possession of the City Council (Fig. 10) for a copy of which I am greatly indebted to Mr. A. H. Brigg, City Surveyor. This explains the position by showing Sir Francis Forbes' (Chief Justice's) grant as at the western end of the block between Stanley and Francis Streets, and from the latter to the Old Toll House, which stood at the corner of College and Liverpool Streets.

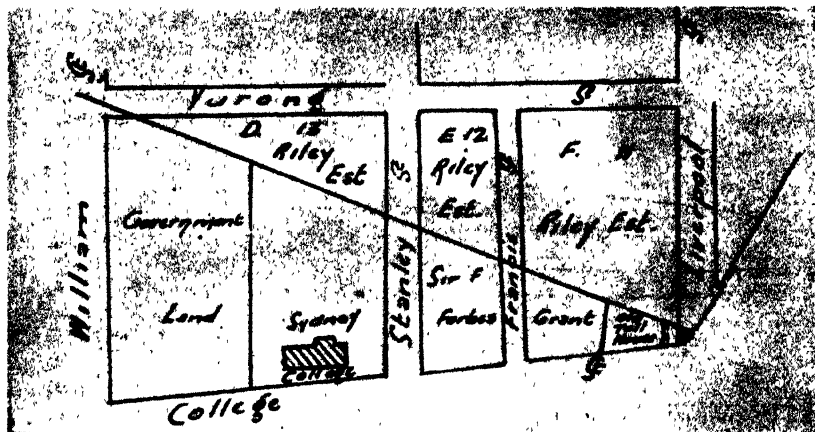


FIG. 10.

Portion of plan traced from Old Plan in possession of the City Council of Sydney dated Oct. 3rd, 1844, showing the position of the "Government Land," on a portion of which the Museum now stands.

There is even an older plan in existence of a part of this "reserve for Government purposes," mentioned in Mr. Perry's letter (p. 350), showing the present Museum site as a portion of the "Old Convicts' Garden" (Fig. 11), the proposed Park-William Street bisecting it. This plan, now in the Mitchell Library, and signed by the Surveyor-General, Sir T. L. Mitchell, is entitled as follows:—

"Sketch of a General Plan for the Regular Extension of the Streets of Sydney."

⁶⁰ Fowles again fell into error when he said the Museum site was at the "corner of William and Stanley Streets" (Sydney in 1848, etc., 1878, p. 84).

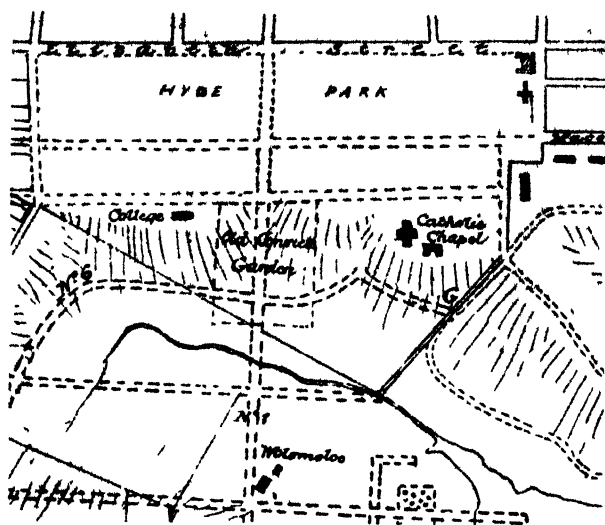


FIG 11.

Part "Sketch of a General Plan for the Regular Extension of the Streets of Sydney, 7th June, 1831," by Sir T. L. Mitchell, Surveyor-General, showing position of the "Old Convict's Garden."

and is dated 7th June, 1831. With this plan (Fig. 11) is a letter from the Surveyor-General to the Colonial Secretary [Honorable Alexander Macleay], dated 21st November, 1831, as follows⁶¹ :—

"I have the honor to transmit a plan for the extension and improvement of that part of Sydney adjoining Hyde Park, and for laying out the latter with more advantage as a place of public recreation. I would, therefore, do myself the honor to suggest, for the approval of His Excellency, the Acting Governor, that no buildings should be erected, or allotments granted, on the enclosure within the brick wall named the "Convict Garden," but that that wall be removed, and the whole of the ground within that, and also that between the Catholic Chapel and Woolloomooloo boundary, be added to, and considered a part of, what is called "Hyde Park." I have the honor to submit this suggestion, because the principal charm of Hyde Park, or the Racecourse, is the view seen from it of the waters of Port Jackson, the Heads, etc., and the sea breeze which is freely admitted on that side from Woolloomooloo Bay, but which would be entirely shut out had the space named the "Convict Garden" been covered with buildings."

The plan, prepared by the Government Architect to the order of Sir George Gipps, was submitted to the Museum Committee by Mr. Lewis, and received the former's approval. It was accompanied by a letter from His

⁶¹ Report upon the Progress made in Roads, and in the Construction of Public Works, in New South Wales from the year 1827 to June, 1855, by Colonel Sir T. L. Mitchell, Surveyor-General (Sydney—Printed by William Hanson, Government Printer, Hyde Park, 1856), p. 51.

Excellency "sanctioning the erection of the Museum." This plan was also submitted to the Colonial Secretary, Mr. Lewis saying in his covering letter :—

"The plan requested, drawn in accordance with the general views of the Committee, and although the design is not so ornamental as I could wish, yet it is chaste, and affords all the accommodation requisite for some years to come, and is so planned to admit a great extension on a superior scale as well as ornament hereafter." (Pl. xlv.)

On the 12th February, 1846, a letter was received from the Colonial Secretary [Honorable E. Deas Thomson] informing the Committee that the Colonial Architect :—

"has been authorised to proceed with the Building" :—

Colonial Secretary's Office,
Sydney, 12th February, 1846.

Gentlemen,

With reference to my letter of the 4th instant, respecting the Site granted for the erection of a Museum, I do myself the honour to inform you that, by command of His Excellency the Governor, the Colonial Architect has been authorised to proceed with the Building, according to a plan submitted by him, and approved of by His Excellency the sum of three thousand pounds (£3000) having been included in the Estimates for the present year.

I have the honour to be,
Gentlemen,

Your Most obedient servant
for the Colonial Secretary
(Sgd.) W. Elyard, Junr.

The Committee of
The Australian Museum.

The commencement of the present building was made in the early part of 1846, probably late in March, with the construction of a portion of the North Wing, or that part facing William Street, and comprised a basement, area, and area wall, the dimensions, expressed in more than one document emanating from the Colonial Secretary's Office, being 108 feet long by 64 feet wide, 51 feet high, and 352,512 feet cubic contents.

I give the month of March as the commencement of building operations on the faith of a M.S. document in the Mitchell Library :—

"Schedule of Tenders for Works towards erection of a Public Museum, Sydney, received in pursuance of Public Notice dated 15th February, 1846, inserted in the New South Wales Government Gazette of 17. 20. 24 and 27 February, 3 and 6 March, opened in presence of the undersigned on 9 March.

E. Deas Thomson
(Sgd.) Wm. Lithgow
Mortimer W. Lewis, C.A."

This is supported by the following extract from an official letter deposited in the same Library. Through it we learned the name of the contractor :—

No. 46/59.

Colonial Secretary's Office
Sydney, 13th March, 1846.

Sir,

In transmitting to you the enclosed Schedule of Tenders for the performance of certain Works towards the Erection of a Public Museum, I am directed by the Governor to inform you that His Excellency approves of the Tender of Mr. George Paton being accepted.

I have, etc.

The Colonial
Architect.

for the Colonial Secretary
W. Elyard, Junr.

There is certainly a discrepancy in dates, unfortunately, in connection with the commencement of building operations, for in more than one communication from the Museum Hon. Secretary (Lt. R. Lyd, R.N.) to the Colonial Secretary the former complains that:—

“This building was commenced in January last year⁶².”

In the face, however, of the documents quoted, I think, the latter end of the first quarter of 1846 may be accepted as approximately the date of commencement of the Australian Museum building as we now know it. The time allowed by the Colonial Architect for the completion of the work was eighteen months:—

“Mr. Lewis informed the meeting that the new building would require eighteen months to complete, but that within three months he would be able to afford the Curator a sufficient workshop in the building⁶³.”

5—FINANCIAL, ETC.

The financial position of the Colonial Museum from June, 1829, to December, 1837, has already been given (Part i., p. 70). From 1832 to 1837 the voted income never exceeded £200 per annum. In 1833-36 this was apportioned, according to “Raymond’s New South Wales Calendar,” etc.⁶⁴, as follows:—

“Zoologist	..	..	..	..	..	£130	0	0
Purchase of Specimens	..	..	..	..	..	70	0	0
						£200	0	0.”

but, in the official statement referred to above, there was no expenditure in 1833, and only the most trivial in 1832. In 1836 the allowance was subdivided in this manner:—

“To the Keeper of the rooms	..	..	..	..	..	£10	0	0
Collector and preserver of specimens at 1s. 9d. the hour	..	..	..	..	..	32	0	6
Providing specimens and incidental expenses	..	..	..	..	..	157	19	6
						£200	0	0.”

The income was again £200 in 1837⁶⁵, and this sum was continued as the annual allowance up to and after the institution became regularly known as the Australian Museum, certainly until 1846, but was increased shortly afterwards.

As an instance of the Institution’s scanty means is the following:—A letter of 5th October, 1836, is extant, informing the “Superintendent,” Dr. George Bennett, that as remuneration for the conducting of the

⁶² Letter, 47/2709, 31st March, 1847.

⁶³ Minutes, 7th July 1846.

⁶⁴ Raymond’s N.S.Wales Calendar and General P.O. Directory, 1833, p. 266; 1834, p. 261; 1835, p. 405; 1836, p. 190.

⁶⁵ Macarthur—“N.S.Wales; Present State and Future Prospects,” 1837, p. 220 (Appendix No. 46); Raymond—*Loc. cit.*, 1837, p. 202.

"That the Duplicate Specimens be distributed to the various European Museums."

In particular two large exchanges were received from the Asiatic Society in 1844 and 1846 respectively.

6.—BUILDING OF THE AUSTRALIAN MUSEUM, AS WE KNOW IT, 1846 TO 1863 INCLUSIVE.

The construction of the first portion of the Museum, or North Wing, gave rise to misunderstanding, expostulation, and recrimination, that it would be as well to avoid, if possible, but these happenings are so intimately interwoven with its history they must be touched on to render the latter clear and succinct. There were originally three contracts, viz. :—

- Contract No. 1—"consisting in excavating for the whole building to a solid stratum to receive the foundation," etc.
- „ 2—Placing six girders, forty feet long, on the foundation walls⁷², and floor of joists.
- „ 3—Carrying up the walls to the requisite height to receive the roof⁷³.

Assuming the date of commencement given to be approximately correct, we then find the Committee exactly twelve months after referring to⁷⁴ :—

"The very slow progress making in the erection of the building."

and instructing their Honorary Secretary (Lient. R. Lynd, R.N.) to :—

"Address a letter to the Colonial Secretary [Honorable E. Deas Thomson] complaining of this delay, and soliciting the interference of the Governor"!

In this letter occurs the following passage :—

- * The Committee would desire to observe to you that this building was commenced in January last year [i.e., 1846]. That the Architect, Mr. Lewis, himself a Member of the Committee was fully aware how desirable it was, that the work should be brought to an early completion and, in fact, that he had, to meet the earnest wishes of the Committee distinctly promised, that a portion of the building should be available for the purposes of the Museum, by the end of October last Up to the present the building has progressed but little beyond the basement⁷⁵.

That is to say, in practically twelve months only the foundations and basement had been completed, or Contract 1 and part of 3. The letter concluded by detailing some of the difficulties under which the Institution continued to labour.

⁷² These wooden hardwood girders are as good to-day as that on which they were placed in position.

⁷³ Letter from Colonial Architect to Colonial Secretary, 6th April, 1847.

⁷⁴ Minutes, 27th March, 1847.

⁷⁵ Letter 47/2709, 31st March, 1847.

The Colonial Secretary's reply, bearing date 17th April, 1847, covered an explanation⁷⁶ by the Colonial Architect, a lengthy document giving measurements and details of work done, and from which we gather that the building had progressed but little beyond the basement.

Up to the 25th May, 1847, the cost had amounted to £1,028/14/8, thus⁷⁷ :—

In 1846.	For Excavation and Masonry	£844	0	4
„ 1847.	„ Masonry and Timber ...	384	14	4
		<hr/>		
		£1,028	14	8

leaving unexpended a balance of £1,971/5/4 of the original £3,000 voted, which Mr. Lewis anticipated would be enough to carry up the walls and roof of the building.

The next trouble to be faced by the Committee was that of money, as we learn from the following letter :—

Australian Museum,
6th June, 1847.

Sir,

By direction of the Committee for managing The Australian Museum I have the honor to state to you for the information and consideration of His Excellency the Governor, that from a statement made to The Committee by the Colonial Architect, they have every reason to believe, that the sum already granted (£3,000) for the erection of the Museum will be entirely expended by the end of the current year, at which time the body of the Building will have been carried up and roofed in, agreeably to the very exact estimate framed by Mr. Lewis at the commencement of the Work. To carry out, however, the original design adopted by The Committee, a further sum, estimated by Mr. Lewis at £2,000, will become necessary, and, accordingly, The Committee respectfully beg that His Excellency would be pleased to direct that a sum to that amount be placed upon the Estimates of The Public Expenditure now about to be laid before the Legislature, for this service.

I have the honor to be,

Sir

Your most obedient humble servant

(Sgd.) Robt. Lynd,
Honory. Secretary.

A minute attached to the letter, by the Colonial Architect, explained that the sum voted for the completion of the design would have sufficed had it not been for an increased wages bill. An estimate of an extra £1,000 was given as the sum necessary to complete "the interior according to the original plan;" and to provide an internal gallery and external portico, as desired by the Committee, a further £1,000, together making the sum asked for by Lieut. Lynd.

Both the gallery (the present Mineralogical Gallery) and the portico were subsequently erected (Pl. xlv.). The latter was still in existence when I joined the Museum Staff (Pl. xlvii.), and beneath it my predecessor, Dr. E. P. Ramsay, had a large aviary. This portico was demolished in 1892, when the North Wing was enlarged.

⁷⁶ Letter 47/2888, 6th April, 1847; Minutes 17th May, 1847.

⁷⁷ Minutes, 25th May, 1847; *Id.*, 14th September, 1847.

The request for an extra £2,000 was refused by His Excellency (Sir Charles Fitzroy) in the following terms⁷⁸ :—

Colonial Secretary's Office
Sydney, 24th June, 1847.

Sir,

I have the honor to acknowledge receipt of your letter of the 6th Instant, requesting, by direction of the Committee for managing the Australian Museum, that the further sum of £2,000 may be placed on the Estimates to complete the Museum according to the original design. Having laid your communication before the Governor, I am desired to inform you that His Excellency regrets that the state of the Finances of the Colony, and the other large and urgent demands upon the Revenue, will not allow of His entertaining, at present, a request for so considerable a sum as £2,000 in addition to that already voted for the purpose.

I have the honor to be

Sir,

Your most obedient servant,
for the Colonial Secretary,
(Sgd.) W. Elyard, Junr.

Robert Lynd, Esq.
Honorary Secretary
to the Committee for
Managing the
Australian Museum.

At the same time the yearly allowance was increased to £300 for general purposes⁷⁹.

Undismayed by those rebuffs, the Committee again resolved, on the 14th September :—

“That the pressing necessity for further support should be again brought under the notice of the Governor.”

and the Honorary Secretary was instructed to ask for a further £1,000 (instead of £2,000 as before). This, however, was refused by letter of 21st September :—

“As the financial arrangements for the present year are closed, but if the improved state of the Revenue will admit of it, a sum will be placed on the Supplementary Estimates.”

By the 30th November, 1847, the Colonial Architect reported the walls carried up, and nearly ready to receive the roof⁸⁰.

The request for the £1,000 was duly honoured as will be seen by the following :—

Colonial Secretary's Office,
Sydney, 10th January, 1848.

Sir,

With reference to your letter of 14th September last, requesting that by direction of the Committee of the Australian Museum a further grant of one thousand pounds in aid of the funds for the erection of the Building; and to my reply of the 21st of the same month, stating that the Governor could not then accede to the above request as the Financial

⁷⁸ Also Minutes, 14th September, 1847.

⁷⁹ Minutes, 4th December, 1847.

⁸⁰ Letter No. 47/9442. This money, voted in 1847 “for the completion of the building,” the Committee subsequently complained was employed in “raising the walls.”

arrangements for the year 1847 were closed, I am now desired by His Excellency to inform you that a vote of £1,000 as a further sum "for the erection of the Public Museum at Sydney" was subsequently proposed and agreed to by the Legislative Council.

I have the honor to be,

Sir,

your most obedient servant,

for the Colonial Secretary,

W. Elyard, Junr.

Robert Lynd, Esq.,

Honorary Secretary

to the Committee of

The Australian Museum.

In October, 1847, Lient. R. Lynd found it necessary to resign the Honorary Secretaryship. His last attendance at a meeting was on 12th October. He was succeeded by the Rev. George E. Turner, who became a committeeman in 1845, and at once assumed the duties.

It is always interesting to ascertain when customs or methods of procedure, still existing, first came into force. Thus, the first indication of that most valuable adjunct to Museum display and scientific investigation, moulding and casting, otherwise replica work, appeared as early as 1848, when :—

"The Committee ordered the sum of sixteen pounds to be paid to Mr. Circuit for making several casts of the bones of a *Diprotodon* discovered and brought to Sydney by Mr. Turner, of the Darling Downs⁸¹."

The Presiding Officer at a now-a-day's Board is styled the President. This title appeared for the first time in April, 1848, but not coupled with the name of any of those present at the meeting⁸². The matter was evidently revived again in 1852, when Dr. George Witt moved that a "President of this Committee" be appointed for the year 1853⁸³. This, however, does not appear to have been acted on, as the word "Chairman," or "in the Chair" continued to be used as heretofore.

For some years during the term of office of my predecessor, Dr. E. P. Ramsay, dredging in Port Jackson was the order of the day at least once a week. This time honoured custom was first inaugurated during Curator Wall's rule, as it is recorded on the Minutes of 21st September, 1848, that :—

"Mr. Wall was then authorised to purchase a dredging machine for the use of the Museum, the expense not to exceed two pounds."

⁸¹ Minutes, 26th February, 1848. The *Diprotodon* remains in question were thus referred to by the Rev. W. B. Clarke :—"In the year 1847 Mr. Turner, a settler on the Downs, brought to Sydney a large collection of bones dug up from the banks of King's Creek, and together with Dr. Leichhardt and Mr. Wall, of the Australian Museum, I assisted in putting together such as correspond. The result of our labour was the construction of the head of a *Diprotodon* of such enormous proportions, that it measured four feet in length from the frontal bones to the occiput"—New South Wales Geological Surveys, Report No. x. (*Votes and Proceedings*, 1853) p. 5. An extended account was also given in the "Appendix to Report No. x," Nos. 1-5, pp. 11-17. The original collection made by Mr. Turner was, Mr. Clarke said, "sold to Mr. Boyd." Now Sir Richard Owen records the sale in London "of a series of Australian Fossils sent to London from Sydney by a Mr. Boyd," and among these was the head of a *Diprotodon* (*Phil. Trans.*, clx., 1870, p. 521).

⁸² Minutes, 22nd April, 1848.

⁸³ Minutes, 30th October, 1852.

There was no lack of applicants for the use of the "large room" as it neared completion. The "Society for the Promotion of the Fine Arts in Australia" held its summer meeting there with the permission of His Excellency the Governor-General⁸⁴. The "Australasian Botanical and Horticultural Society" also held its monthly meetings in the Committee Room (now the Board Room), commencing in September, 1846⁸⁵. But possibly the meeting that attracted the largest amount of public attention was a ball given in "Commemoration of the first Steam Mail communication [R.M.S. 'Chusan'] between Great Britain and Australia," and the Museum was in consequence closed for a month⁸⁶! Date of the ball was 26th August.

In these early days the contents of the Australian Museum was of a dual nature, Natural History on the one hand, Fine Arts on the other. The latter consisted of "Casts from the Antique" presented by Sir Charles Nicholson in November, 1849⁸⁷. The walls of the Committee Room (the present Board Room) were ordered to be painted dark red as a set-off to the white statuary⁸⁸. Later this was amplified by a purchase for £320 of other pieces from a Mr. Nichol in 1852⁸⁹. These were placed in the "great hall," but in July, 1853, their removal became necessary during the erection of a contemplated gallery around this room; further, at this date the replicas were not paid for⁹⁰!

Through the disastrous ending of the Kennedy Expedition to Cape York in 1848, the services of Mr. T. Wall, as Collector, were lost⁹¹; he was appointed in April, 1848. When it was determined to fit out an Expedition to Shelbourne, or Weymouth Bay, to search for any chance survivors, it was contemplated by the Trustees to send the Curator, Mr. W. S. Wall, as one of the party to endeavour to recover any objects of Natural History collected by his brother⁹², but the suggestion fell through⁹³.

About this time the Director of the Botanic Gardens (Mr. Charles Moore) was asked to lay out and plant the ground in front of the Museum. From Mr. Moore's predilection for that scourge of gardens, the Moreton Bay Fig, this occurrence probably marks the date of planting of the trees but recently removed⁹⁴.

A study of the "Minutes" of this period, aided by the perusal of documents preserved in the Museum archives, and elsewhere, plainly

⁸⁴ Document B. 10.48

⁸⁵ Minutes, 24th Sept. 1848.

⁸⁶ Minutes, 11th Aug. 1852; Document A. $\frac{19.52}{2}$

⁸⁷ Document C. $\frac{30.49}{4}$

⁸⁸ Minutes, 6th Oct., 1849.

⁸⁹ Minutes, 24th Oct., 1852; Letter-book, i., p. 126.

⁹⁰ Minutes, 30th July, 1853.

⁹¹ Minutes, 17th March, 1849.

⁹² Minutes, 17th March, 1849; Letter-book, i., p. 94.

⁹³ Minutes, 24th March, 1849; Document B.B. $\frac{10.49}{1}$

⁹⁴ Minutes, 26th May, 1849.

reveals the growing dissatisfaction on the part of the Committee at the slow progress made by the Contractors, nature of the work done, and the excess of cost over estimate. This was explained by Mr. Lewis as due to the advance in wages and cost of material over those ruling in 1845. The items of excess were thus shown :—

" Original Estimate	...	...	...	...	...	£3000
Additional masonry in basement	...	...	...	...	£588	
Increased rate of wages and materials	...	...	...	2250		2836
						<hr/> £5888 "

So grave, indeed, had matters become in connection with the erection of this edifice that they came under the notice of the Executive Council :—

" Summary of Proceedings of the Executive Council on the 22nd May, 1849, relative to the Estimates prepared by the Colonial Architect for building the Cemetery Wall and the Museum. Minute Nos. 49/21."

After the perusal of documents and examination of witnesses, the Council recorded its opinion in these words. The estimates :—

"for the building in question, and especially for the Cemetery Wall, were prepared loosely and without taking into consideration the nature of the ground on which they were to be erected. It is also clear that the Colonial Architect was fully aware that the cost of the buildings at the rate at which the first contracts were taken would vastly exceed that stated in his estimate, but that he did not in any way bring this fact under the notice of the Government when the acceptance of the Tenders was under consideration, so far as to afford any opportunity of deferring the commencement of the work until the increased expenditure should have been sanctioned by the Legislative Council. In these particulars at least the Council are of opinion that the conduct of the Colonial Architect was highly reprehensible, and that His Excellency the Governor would be pleased to instruct the Colonial Architect to furnish detailed statements of expenses incurred in the construction of the Museum, from the first commencement up to the present day, such accounts to be drawn up in the usual form of a debtor and creditor account."

In the meantime (1st September, 1849) the Committee deputed a few of the members to wait upon the Governor (Sir Charles A. Fitzroy) to urge upon His Excellency the immediate necessity of a further grant of £1,000 to complete the roof.

On 6th September, 1849, the Colonial Secretary (Honorable E. Deas Thomson) addressed a letter to the Committee expressing the wish of the Governor :—

"That the Museum Committee should form themselves into a Board to ascertain the amount of the debt which had been incurred in the erection of the Colonial Museum over and above the sum voted by the Legislative Council . . . of the work actually performed whether it tallied with the vouchers and accounts sent in by the Government, and to report what amount may be justly due to the Contractors, as well as the sum that will be required in excess of the Supplementary Vote for 1849 and the Vote for 1850, to place the building in such a state as to secure it from damage from bad weather."

A statement of the sums disbursed, in accordance with the above, was duly furnished by the Colonial Architect on the 10th September, and by the Auditor (Mr. William Lithgow) on the 12th September. In

conformity with the Governor's desire the Committee lost no time in forming its "Board," and at first appear to have contemplated employing Mr. F. T. Blacket to conduct investigations on its behalf,⁹⁵ but at its next meeting the names of Messrs. Robertson and Duer were substituted⁹⁶.

I have before me only the draft of the letter conveying this information, signed by Mr. William Sharp Macleay, to the Colonial Secretary. In this Mr. Macleay says:—

"The Committee referred the examination and valuation of the works done in the Museum together with the claims of the various Contractors to two professional gentlemen, Messrs. Robertson and Duer."

On the 21st September, 1849, the Rev. G. F. Turner was informed an additional £500 had been placed on the Supplementary Estimates and voted, but must await the result of the investigation of the claims against the Government then going on⁹⁷. This was, as the Committee expressed it:—

"for roofing in the Building and protecting their Collections from exposure to the weather."

Apparently it was paid some time early in 1850.

A document bearing date 23rd October, 1849, gives the amounts so far voted for the building as revealed by the "Appropriation" Acts, and the dates of the assent to those Acts, to be as follows:—

8th June, 1845	..	..	..	..	..	..	£3,000
2nd October, 1847	..	..	..	..	..	..	1,000
16th June, 1848	...	..	..	...	..	..	1,500
							<hr/>
							£5,500

A detailed statement of expenses prepared by Mr. Lewis, and furnished by the Colonial Secretary, 17th October, 1849, informs us that from October, 1846, to November, 1848, the cost had amounted to £5,485/13/9, and that to complete the roof (i.e., to the original plan) a further sum of £267/9/4 was required.

The report of Messrs. Robertson and Duer bearing date 5th October, 1849, is a very lengthy technical document that would be of little or no interest to readers of this account, but all that is necessary can be gathered from the "Report of the Australian Museum Board" founded on the above, and dated 26th October⁹⁸.

The Board stated, *inter alia*, that the construction of the building, as it then stood, differed in several respects from that formerly approved by the Committee, more particularly in having a central dome or cupola (Pl. xlv.). a recapitulation of the matters accounting for the various sums of money asked for and their disbursement. The Committee concluded this portion of the "Board's" Report by suggesting that all future sums should be placed "under their sole control⁹⁹."

⁹⁵ Minutes, 8th September, 1849; Letter-book, i., p. 102.

⁹⁶ Minutes, 15th September, 1849.

⁹⁷ Document, No. 49/254.

⁹⁸ Document, 49/10513, 31st October, 1849.

⁹⁹ Also in a letter of 20th August, 1849 (Letter Book, i., p. 98.)

At this period the Museum Committee consisted of the following prominent citizens:—

William John Macleay, Esq.
 George Macleay, Esq.
 William Macarthur, Esq.
 Charles Nicholson, M.D.
 Captain P. P. King, R.N.
 George Bennett, Esq.
 Mortimer W. Lewis, Esq.
 Archibald Shanks, M.D.
 Staff-Surgeon Loftus Hartwell
 Rev. W. B. Clarke, M.A.
 Rev. Robert Lethbridge King, B.A.
 John Mitchell, M.D.
 Rev. George E. Turner, Hon. Secretary
 John Bidwell, Esq.

It may not be uninteresting to reproduce here a facsimile of the proclamation appointing the First Committee in 1836¹⁰⁰ (Fig 12).

*Colonial Secretary's Office,
 Sydney 14th June, 1836.*

HIS Excellency the GOVERNOR directs it to be notified that the following Gentlemen have been appointed "A COMMITTEE OF SUPERINTENDENCE OF THE AUSTRALIAN MUSEUM AND BOTANICAL GARDEN," viz.:—

THE HONORABLE ALEXANDER M'LEAY, Esq.
 SIR JOHN JAMISON, K.G.V.
 PHILLIP PARKER KING, Esq.
 WILLIAM MACARTHUR, Esq.
 JOHN VAUGHAN THOMPSON, Esq.
 CHARLES STURT, Esq.
 EDWARD DEAS THOMSON, Esq.
 GEORGE PORTER, Esq.
 ROBERT ANDREW WAUGHAN, Esq. and
 GEORGE M'LEAY, Esq.

*By His Excellency's Command,
 ALEXANDER M'LEAY.*

FIG. 12.

¹⁰⁰ Government Gazette, 1836, p. 451.

The result of Messrs. Robertson and Duer's investigations was briefly as follows:—

" Payments by Colonial Treasury	£5,505	17	1	
Outstanding claims due ¹⁰¹	1,640	1	3	
				£7,145 18 4
Work done and materials supplied				5,228 15 3
				<hr/>
Surcharge				£1,917 3 1

or a sum actually overpaid by the Treasury of £277/11/10, which "will more than meet the expense of placing on the building a roof with sky lights."

The Committee then proceeded to pass very caustic remarks on the uncertain, if not wilfully confused manner in which claims are made on the Colonial Treasury; the shortcomings of the respective Contractors; extra charge for materials over contract price; material totally unaccounted for; non-delivery of material charged for in accounts; wages expended on non-existent workmen, etc.

In reading the minutes and documents of this period, the mind of the reader cannot divest itself of the official misunderstandings that seem to have existed between the Museum Committee and the Colonial Architect on the one hand, and between the latter and his official superiors on the other hand. In fact, this is evident from the tone of a letter from William Sharp Macleay, the Chairman of the aforementioned Board, bearing date 26th October, 1849. The length and redundancy of this document, and also the fact that it is in many ways a recapitulation of what has gone before, renders its transcription here unnecessary.

As if all these contrarieties were not sufficient, differences arose between the Committee and their advising architects as to the matter of payment of the latter's costs. An "Action of Debt" was entered in the Supreme Court, the nominal defendants being the Rev. G. E. Turner and W. Sharp Macleay¹⁰². I have not been able to ascertain exactly how this action ended, but apparently it was ultimately settled by arbitration, Mr. W. M. Manning (His Honor Sir W. M. Manning) being the arbiter.

On the 3rd June, 1850, the Rev. G. E. Turner wrote to the Colonial Secretary asking that¹⁰³:—

"The whole of the unoccupied land within the present enclosure on the south and west sides of that portion which has been allotted for the erection of the National School" [Yurong Street Public School now]

might be added to the Museum grant. This was acceded to by His Excellency, Sir C. A. Fitzroy, and the Committee informed accordingly on 16th July, 1850¹⁰⁴.

¹⁰¹ Distributed over four Contractors (Document 49/10513, 31st October, 1849; Letter-book, i., p. 107.)

¹⁰² Letter No.50/525, 13th August, 1850.

¹⁰³ Letter-book, i., p. 113.

¹⁰⁴ Document, 50/5373.

Even at the beginning of 1850 the roof had not been completed, for on 30th March of that year it was resolved that :—

“ Mr. Blacket¹⁰⁶ be requested to inspect the roof and report generally to the Committee as to the best mode of completing the sky-lights.”

At the same meeting the Honorary Secretary announced the receipt of £990/5/- from the Government “ towards the completion of the Roof, etc.¹⁰⁶” Mr. E. T. Blacket was instructed on 3rd August to prepare plans and specifications “ for the completion of the Building¹⁰⁷.” The tender of a Mr. Inder (£794/5/-) was accepted on 12th October, 1850¹⁰⁸. It is clear that even before the completion of the roof the minds of the Committeemen were occupied with the question of fittings for the room, which afterwards became known as the “ Old Hall,” a Sub-Committee, consisting of Dr. Charles Nicholson, and Messrs. W. J. Macleay and E. T. Blacket, being appointed for the purpose¹⁰⁹.

Mr. Edmund Thomas Blacket, referred to above, the second Colonial Architect, successor to Mr. Mortimer William Lewis, was appointed Committeeman in March, 1851¹¹⁰, and into his hands passed the structural work of the Museum for the time being.

At this time came to an end the connection between the Museum and the Botanic Garden, a resolution to the effect that the “ Committee should be relieved from the present reference to it ” (i.e., the Gardens) having been passed on 15th November, 1851¹¹¹. This was communicated to the Colonial Secretary two days later¹¹². The latter replied on the 23rd¹¹³ granting the request and saying :—

“ His Excellency [Sir C. A. Fitzroy] is fully sensible of the advantage which has been hitherto derived from your connection with it.”

In pursuance of the selection of a Fittings Committee the Honorary Secretary was instructed on the 26th June, 1852, to apply for the insertion of £3,000 on the Supplementary Estimates¹¹⁴.

An extraordinary request was received from the Secretary to the University of Sydney, by direction of the Vice-Provoost asking for a conference between Committees of the Senate and Museum respectively with :—

¹⁰⁵ Mr. E. T. Blacket had in the meantime succeeded Mr. M. W. Lewis as Colonial Architect.

¹⁰⁶ Minutes, 30th March, 1850.

¹⁰⁷ Minutes, *ibid.*

¹⁰⁸ Minutes, 12th October, 1850.

¹⁰⁹ Minutes, 8th February, 1851.

¹¹⁰ Document, 3rd March, 1851.

¹¹¹ Minutes, 15th November, 1851.

¹¹² Letter-book, i., p. 117.

¹¹³ Document, 51/10865.

¹¹⁴ Minutes, 26th June, 1852; Letter-book, i., p. 123.

"A view of ascertaining upon what terms the Museum and grounds might be transferred to the University, and of course to ascertain primarily whether any proposition would be entertained by the Committee of the Museum."

The Committee's reply was brief and to the purpose:—

"It was unanimously resolved that its acceptance would be detrimental to the interests of the Museum, whilst, moreover, it is one which the Committee, under its present constitution, is not competent to entertain¹¹⁵."

Through a letter from the Rev. G. E. Turner to the Colonial Secretary, of 18th March, 1852, we learn that at that date the building was actually finished. There occurs this expression:—

"Now that the building is complete¹¹⁶."

Dr. John Smith, the first Professor of Chemistry at the Sydney University, was appointed a member of the Committee in November, 1852¹¹⁷.

As to the above £3,000 for casing the Governor expressed his unwillingness to grant so large a sum¹¹⁸, to which the Committee replied:—

"That he would have the goodness to cause any sum which he may think sufficient to be placed on the Supplementary Estimates."

Before the question of fittings could be taken into serious consideration the erection of a gallery and railing became necessary. For these the Government provided £500¹¹⁹, and in July a tender for £390 from Mr. Abbott for building the gallery was accepted¹²⁰. To enable this to be carried out successfully the "Old Hall" was stripped of "all objects of Art and Natural History," and the room closed to the public¹²¹. The railing surrounding this gallery was to cost £210¹²².

The death of John Carne Bidwell, Esq., a member of Committee, was reported on the 2nd April, 1853¹²³.

The year 1853 was a momentous one in the history of the Museum. It was in July of that year that the Rev. G. E. Turner retired from the position of Honorary Secretary. His place being taken by Mr. George French Angas, who, on the 30th July, was appointed Secretary and Accountant. The interval between the retirement of one and the

¹¹⁵ Letter-book i., p. 119; Minutes 20th January, 1852.

¹¹⁶ Letter-book i., p. 123.

¹¹⁷ Document B. 10.52.

¹¹⁸ Minutes, 24th July, 1852.

¹¹⁹ Minutes, 7th May, 1853; Letter-book i., p. 127. (Also Minutes, 8th September, 1849; 16th February, 1850.)

¹²⁰ Minutes, 2nd and 9th July, 1853.

¹²¹ Minutes, 9th July, 1853.

¹²² " " "

¹²³ Minutes, 2nd April, 1853.

appointment of the other was filled by Dr. George Witt, who had been a member of Committee since 1852, acting as Honorary Secretary¹²⁴.

The year 1853 also saw the abolition of the Committee System of administration, and the establishment of a body of Trustees under an Act of Incorporation. I think the first step towards the consummation of this very desirable proceeding took place on the 8th February, 1851, when the following members of Committee:—

“ Were appointed a Sub-Committee to consider and report upon the best means to be adopted for ameliorating the Constitution of the Committee of Management of the Australian Museum and Botanic Garden, viz., Dr. Nicholson, E. Deas Thomson, and W. [Sharp] Macleay, Esqrs.¹²⁵ ”

As a result of the appointment of the above Sub-Committee it was proposed on the 4th December, 1852, by Captain [Admiral] P. P. King, R.N., and seconded by Hon. [Sir] William Macarthur that:—

“ A Sub-Committee be appointed to consider the propriety of applying to His Excellency the Governor General requesting that His Excellency will be pleased to introduce a Bill into the Legislative Council during its next Session having for its object the Incorporation of the Institution and the investment of the Building and other property belonging to it as Trustees, to be nominated in the first instance by His Excellency¹²⁶. ”

On the 1st January, 1853, the above gentlemen made their report to the Committee of Management, a very lengthy and comprehensive document, of which the following is one of the most important paragraphs¹²⁷:—

“ They have had under consideration the Constitutions of the most distinguished Public Museums in Europe, and have found that these may all be resolved into two classes, to wit, those which are governed chiefly by Administrators of rank or political influence, and those which are administered by Professors of Science or Literature. The British Museum may be taken as a fair type of the former class, and the *Jardin des Plantes* at Paris of the latter.”

The report then described in great detail the constitutions of these Institutions, and continued:—

“ Your Sub-Committee therefore propose that the system of the British Museum, as it has been lately modified in pursuance of the suggestions contained in the Report of the Committee of Parliament before alluded to should be adopted as far as possible by the Australian Museum. They would even recommend the appointment hereafter by a special Act of Council of a Family Trustee, whenever any remarkably munificent donation or bequest shall have been made to the Museum; and they venture to make this recommendation, not only because members of the family of a donor usually watch, with advantage to the institution, over the fulfilment of any contract or conditions as to the preservation of the objects so given or bequeathed, but still more on account of its having been found that nothing has encouraged liberality towards the British

¹²⁴ Minutes, 9th and 30th July, 1853. In July of this year Museum “Registers,” or as they were then termed “Records of Contributions,” were first established (Minutes, 30th July, 1853).

¹²⁵ Minutes, 8th February, 1851.

¹²⁶ Minutes, 4th December, 1852.

¹²⁷ Minutes, 1st January, 1853; Document, B — 35.53

Museum on the part of private individuals so much as their foreknowledge that a member of the donor's family would have the special privilege and power of watching over the manner in which his intentions might be carried into effect. Within the last ten years property to the amount of half a million sterling is stated to have been bestowed on the British Museum Your Sub-Committee think that the Secretary of the Museum should be a paid officer, and that his office and all subordinate employments should be in the gift of the Trustees. In the present infant state of 'the Australian Museum' it is presumed that its division into two Departments, each under the superintendence of a Curator would be sufficient—that is, a Department of Science, and another of Literature and Art"

This exceedingly comprehensive report was signed by Capt. P. P. King, Mr. W. Sharp Macleay, and Dr. George Witt. It was accompanied by a draft of:—

"A Bill to incorporate and endow the Australian Museum."

On the 13th January, 1853¹²⁸, the Draft was adopted by the Committee and ordered to be transmitted to the Governor-General [Sir C. A. Fitzroy]. It was duly passed by the Legislative Council on 23rd June, 1853, and signed at Government House on 4th July, 1853, the signatories being:—

"Charles Nicholson, Speaker, Wm. Macpherson, Clerk of the Council, and Chs. A. Fitz Roy, Governor General"¹²⁹."

And was presented to the now Trustees at their meeting on 9th July, 1853¹³⁰.

This Bill, which remained intact until 1902, need not be quoted at length, but it may be as well to indicate briefly some of its privileges and the absolute control of their own affairs it conferred on the Trustees:—The Body Corporate to consist of twenty-four Trustees, twelve Official and twelve Elective; vacancies amongst the latter moiety to be filled by the election of "such other fit and proper persons" by the general body; five to form a quorum¹³¹; no power to alienate, mortgage, charge or demise, any lands or tenements without the consent of the Governor and Executive Council; permanent endowment of £1,000 per annum; power to appoint and dismiss all servants of the Institution; to have the entire management of all its affairs, concerns and property; power to make, alter, or repeal "By-laws, Rules and Orders;" at least once a year, or whenever the Governor shall signify his pleasure to that effect, "report their proceedings"¹³², the same to be laid before the Legislative Council¹³³; and accounts of expenditure to be furnished annually.

¹²⁸ Minutes, 13th January, 1853.

¹²⁹ Act 17, Victoria No. ii., 4th July, 1853.

¹³⁰ Minutes, 9th July, 1853.

¹³¹ Still the rule. The first record of an election mentioned on the Minutes was that of Committeeman Dr. Archibald Shanks, proposed by Dr. Loftus Hartwell to take the place of Dr. W. Dawson (Minutes, 12th August, 1848.)

¹³² In other words the Annual Report.

¹³³ Now before the House of Assembly and Legislative Council.

The first body of Trustees consisted of the following gentlemen¹³⁴:—

Official.

- The Chief Justice (Sir Alfred Stephen).
 „ Colonial Secretary (Honourable E. Deas Thomson)
 „ Attorney General (Honourable John Hubert Plunkett)
 „ Colonial Treasurer (Honourable Campbell Drummond Riddell)
 „ Auditor-General (Francis Lewis Shaw Merewether)
 „ Speaker, Legislative Council (Sir Charles Nicholson)
 „ Solicitor-General (Honourable William Montague Manning)
 „ Collector of Customs (Honourable John George Nathaniel Gibbes)
 „ Surveyor-General (Sir Thomas Livingstone Mitchell)
 „ Colonial Architect (Edmund Thomas Blacket)
 „ President Colonial Medical Board (James Mitchell, M.D.)
 „ Crown Trustee (Honourable Henry Watson Parker)

Elective.

- Arthur a'Beckett
 George Bennett, M.D.
 John Carne Bidwell
 William Branwhite Clarke, A.M., Clerk.
 Captain Phillip Parker King, E.N.
 Robert Lethbridge King, A.B., Clerk
 William Macarthur
 George Macleay
 William Sharp Macleay
 John Smith, M.D.
 George Edward Turner, B.C.L., Clerk
 George Witt, M.D.

The Act was formally presented to the new “Body Corporate” by the Colonial Secretary on 9th July, 1853, when the Trustees appointed a Committee of the same three gentlemen (King, Macleay, and Witt) who had previously acted, to:—

“Draw out such rules and regulations as may be immediately required for carrying into effect the provisions of the Act of Incorporation.”

The Report of this Committee was received by the Board, as it must henceforth be called, on the 30th July, 1853, and the following were its recommendations¹³⁵:—

- “1. That regular Meetings of the Trustees be held early in every month.
- “2. That at every such meeting an account shall be presented and entered on the Minutes of all expenses incurred during the preceding month including all salaries and wages and the same when audited and found correct shall be paid by cheque or cheques drawn on the Treasurer and signed by not less than two Trustees.
- “3. That the Bank of New South Wales, Sydney, shall be appointed the Treasurer to the Trustees.
- “4. That at every monthly meeting the pass-books from the Bank made up to the day shall be laid on the table and the amount of the balance in hand entered on the minutes of the day.
- “5. That Vouchers for all payments made in accordance with the orders of one monthly Board be presented for examination at each succeeding meeting.

¹³⁴ Minutes, 1st January, 1853: Act of Incorporation, par. iv.

¹³⁵ Minutes, 30th July, 1853. Document A. 10.50,3

- "6. That the Curator shall present at every monthly meeting a detailed list of all contributions to the Museum received during the preceding month together with the names and addresses of the contributors and the same shall be on the minutes.
- "7. That the Chairman shall be requested to propose a *vote of thanks* for every contribution found to be worthy of that attention, and the circular letter conveying such vote of thanks shall be signed by the Chairman and forwarded to every contributor without delay.
- "8. That at the written request of the Chairman of the last monthly meeting or on the order of any three Trustees in writing the Secretary shall be empowered to summon a *special meeting* of the Trustees, and the circular notice by which such meeting is summoned shall state the object for which the meeting is called.
- "9. That in addition to the *Rough Minute Book* the Secretary shall fairly transcribe the minutes of every meeting into a book to be called the "*Fair Minute Book*" and such Book shall contain as the first minute the Report of the Sub-Committee which was delivered in on the 1st January last, upon which Report the present Act of Incorporation was founded and which enters into many valuable details as to the objects contemplated by the establishment of the Museum. That the insertion of this Report be followed by the Act itself and then by the Minutes of the Trustees (as such) commencing with those of the first meeting of the Trustees held July 9, 1853."

This same Sub-Committee was also instructed to make application for a "Deed of Grant":—

"Of the Land and Premises, the Buildings and all objects of Natural History therein contained and all other movable property whatsoever late in the custody of the Committee of Management of the Australian Museum¹³⁶."

As expressed in the following letter¹³⁷:—

Sydney, July 23rd, 1853.

Sir,

The undersigned being the Committee appointed at a Meeting of the Trustees held on Saturday, July 9th, 1853, have the honour (in accordance with the subjoined resolution) to make application for a Grant of the Land, Premises, etc., now in the custody of the Trustees by virtue of the late Act of Incorporation.

We have the honor to be, etc.,

To the Honourable
The Colonial Secretary.

(Signed) George Witt,
Phillip P. King.

In reply the Trustees were informed that it was necessary to refer their application to the Surveyor-General, but it was nearly two years before the deed was delivered to them¹³⁸, although it had been ready in the Colonial Secretary's hands since the 14th March previously¹³⁹, and for it a fee of £1 was paid¹⁴⁰.

¹³⁶ Minutes, 9th July, 1853.

¹³⁷ Document G. 10.50

4

¹³⁸ Minutes, 14th April, 1853.

¹³⁹ Letter-book, i., p. 145.

10.50

¹⁴⁰ Document G ———

4

The Sub-Committee were also charged, it appears, "to direct their attention" in the matter of a Seal, and although "various devices for Arms" were considered, an exact recommendation could not be made at the time. It was, however, suggested that the die-sinking had better be executed in London¹⁴¹. At any rate the design was agreed to and approved (the Lyre-bird, *Menura superba*) on 4th February, 1854¹⁴². But as the next meeting records the fact that a tender was accepted from Mr. James Allan, £10, the die must have been sunk locally¹⁴³; it is a very beautiful piece of work and still in use.

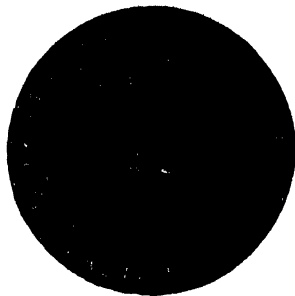


FIG. 13

On August 12th, 1853, Mr. Charles Kemp wrote from the *Sydney Morning Herald* Office to Sir Charles Nicholson suggesting that the "tablet to the memory of Gilbert" be removed from the office in question, where it had reposed for some time, and placed in the Museum. It appears this tablet was provided out of portion of the "Leichhardt Testimonial Fund." The Trustees after considering the matter replied as its unanimous decision, through Dr. Witt, Honorary Secretary, that¹⁴⁴:—

"The Australian Museum was not a suitable place for the erection of a tablet which had been executed in memory of the late Mr. Gilbert¹⁴⁵."

The tablet must, however, have remained here for a time, for Mr. Calvert, one of Gilbert's companions, asked permission, on 1st April, 1854, to deposit it in St. James' Church, King Street.

Also, in August (30th), 1853, the first Crown Trustee was appointed by the Governor-General (Sir Charles Fitzroy) in the person of Henry Watson Parker, Esq., afterwards Colonial Secretary (1856-7).

¹⁴¹ Minutes, 30th July, 1853; Document A $\frac{10.53}{3}$

¹⁴² Minutes, 4th February, 1854.

¹⁴³ Minutes, 4th March, 1854.

¹⁴⁴ Minutes, 3rd September, 1853; Document N 10.50.

¹⁴⁵ John Gilbert was assistant to Charles Gould and aided largely in collecting the material for the latter's magnificent work, "The Birds of Australia" (folio). He accompanied Leichhardt in the Overland Expedition from Moreton Bay towards Port Essington in 1844-5, and was killed by natives on the east side of the Gulf of Carpentaria, 28th June, 1845 (See North—*Rec. Austr. Mus.* vi., No. 3, 1906, p. 125).

I insert here portions of two maps of Sydney bearing date 1854, showing the relative positions of the Museum, Sydney College (Grammar School), and the National School (Yurong Street Public School), one

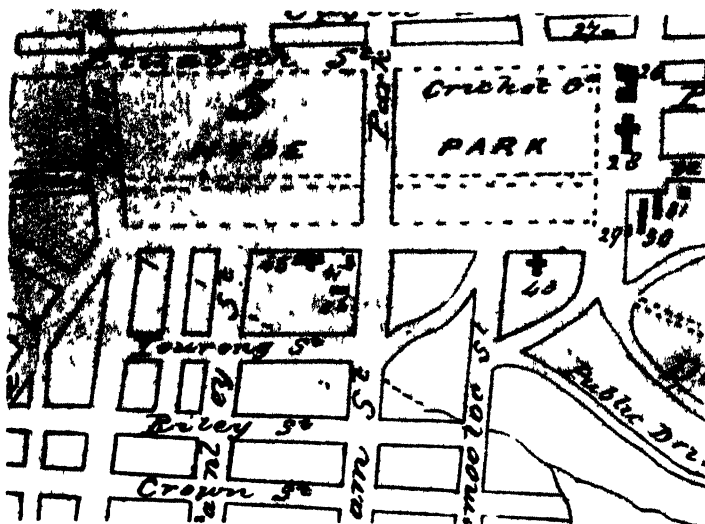


FIG 14

Portion of Hyde Park, College Street, etc , showing position of the
North Wing of the Museum No 41
(Map-frontispiece to Moore's ' Almanac for 1854)

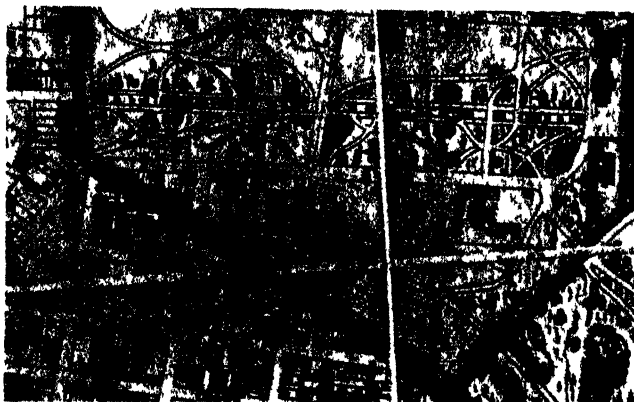


FIG 15

Portion of a more detailed map of nearly the same area, with
the Museum in a more advanced state
(Portion of " Woolcott and Clarke's Map of the City of Sydney,
with the Environs," etc , 1854.)

much more elaborate than the other. Fig. 14 is taken from "Moore's Almanac" for 1854, and forms the frontispiece. Fig. 15 was portion of "Woolcott and Clarke's Map of the City of Sydney with the Environs." etc., 1854.

It is now necessary to again turn our attention to the proposed gallery around the "Great Hall" which we have already seen was to cost £390 for building the gallery and £210 to provide the railing surrounding. I regret to say I am quite unable to disentangle the various contracts entered into and sums asked for towards the building of this gallery. The proceedings in connection therewith seem to have been simply on a par with the hopeless muddle in which everything was steeped relating to this unfortunate North Wing.

In the First Annual Report of the Trustees to December, 1854¹⁴⁶, it is said the building "was utterly unfit for the display of objects of Natural History," the gallery was reported as "nearly completed," but fittings were urgently required. Apparently to meet the cost of these and other services the Legislative Council voted £500 in 1853, and £2,000 in 1854. The "building expenses" between July, 1853, and 31st December, 1854¹⁴⁷, are given in this First Annual Report as follows:—

<i>Estimated Cost.</i>				
1. Cases around Gallery	...	...	...	£1,700 0 0
2. Cases around Hall	...	...	...	1,460 0 0
3. Cabinets on floor of Hall	...	...	...	1,000 0 0
4. Staircase from "Hall" to Gallery	...	...	...	300 0 0
5. Drainage (in basement)	...	...	...	75 0 0
6. Flagging	..	...	...	486 0 0
				£4,971 0 0

In an Appendix to this First Annual Report is given the full cost of this gallery, and this is all I have been able to find about it:—

1853.—Abbott's building contracts	...	...	£1,716 12 8
Bernasconi (mouldings)	...	...	13 13 0
Murray (carving panels)	...	...	60 0 0
			£1,790 5 8

The Annual Report in question was the first of its kind and has been regularly maintained, according to enactment, to the present time, when, as now, it was drawn up by a Committee. The first record occurs in the Minutes of 3rd March, 1855, when Messrs W. S. Macleay, H. W. Parker, W. Weaver, with Dr. John Smith were deputed to so act. The Draft Report was adopted on 7th April, 1855, and at once forwarded to His Excellency the Governor-General (Sir W. T. Denison).

The survival of old customs, wholly or in part, has been one of the marked features of this Institution. For instance, at the present time cheques may be signed by any two Trustees on an emergency to meet an

¹⁴⁶ Published 1855.

¹⁴⁷ Ann. Rept. for 1854-1855, p. 1; Minutes, 2nd September, 1854; Letter-book, i., p. 189.

account, if countersigned by the responsible officer making the request. This practice took its rise as early as 1854 when, on the 4th March, Sir Alfred Stephen moved that any three members of the Board could so act, instead of two as now¹⁴⁸.

Another old custom that survived even up to the time of the writer becoming a member of the Staff was that of forwarding lists of donations to the public press regularly each month. It was in July, 1854, that it was decided to so supply "both" daily papers¹⁴⁹.

On the 23rd January, 1854, the Trustees were invited¹⁵⁰ by the Colonial Secretary (Hon. E. Deas Thomson), on behalf of His Excellency (Sir C. A. Fitzroy) to contribute their "duplicate specimens of Natural History" to the Official Contributions to the "Universal Exhibition for Agriculture and Industrial Products" to be held at Paris in May, 1855. The Trustees were also asked by the Chairman of the Commission (Sir Alfred Stephen) to afford space in the Museum for the display of the exhibits purposed to be forwarded to Paris, to be opened in the "Long Room" (Pl. xlv.) on 2nd October, 1854¹⁵¹.

There are still alive old Sydney identities who remember the Museum "Menagerie." The first resident appears to have been a Tigress purchased of a "Mr. Smith" in November, 1848, for £12, and then placed in the care of Mr. W. S. Wall for six months¹⁵²:—

"When she will be full grown, and may be then killed for the skin and skeleton."

but as a tigress was still present in 1854¹⁵³, this design does not appear to have been carried into effect.

The next guest was a Grizzly Bear presented by Mr. J. D. Nicholls¹⁵⁴ in April, 1854. Up to October of the same year these were supplemented by a Native Dog, or Warrigal, two Eagles and an Emu¹⁵⁵, and at the beginning of 1856 two Native Companions made their appearance in the Museum grounds, but were almost immediately sold to a "Mr. Wilcox"¹⁵⁶ for £5¹⁵⁷. The collection was completed by the addition of a "large Tortoise" which was ordered to be killed and converted into a skeleton¹⁵⁸. Apparently the care of the animals became too much for Mr. Wall, or they began to be regarded as a nuisance, for we find Mr. W. Beaumont, of Beaumont and Waller, Menagerie Keepers at the "Sir Joseph Banks Hotel, Botany Bay," also known as the "Zoological Gardens, Botany,"

¹⁴⁸ Minutes, 4th March, 1854.

¹⁴⁹ " 1st July, 1854.

¹⁵⁰ Document, M. 11696.

¹⁵¹ Minutes, 4th March, 1854; Document G $\frac{60.54}{1}$

¹⁵² " 21st September and 7th November, 1854.

¹⁵³ " 3rd December, 1853.

¹⁵⁴ " 1st April, 1854.

¹⁵⁵ " 7th October, 1854.

¹⁵⁶ " 9th January, 1856.

¹⁵⁷ " 2nd February, 1856.

¹⁵⁸ " 26th November, 1856.

offering to take charge of the Museum animals on certain conditions. The Trustees ultimately consented to the transfer on the following terms, viz.:—payment for the cages, bodies to be returned to the Museum after death, and present to the Trustees the bodies "of such animals as may die in his (Beaumont's) possession¹⁵⁹."

A view of these Botany Zoological Gardens will be found in "Ford's Australian Almanac" for 1853¹⁶⁰. In the same publication for 1851 there is an unpagcd advertisement towards the end of the volume setting forth the attractions of the Gardens, which is rather amusing. This enterprising firm also secured an Elephaut, of twenty months old, brought by the ship "Royal Saxon" from Calcutta in August, 1851¹⁶¹. This Elephant, with other animals, was exhibited "by permission of the Right Worshipful the Mayor and Corporation" on Hyde Park, at the corner of Park and Elizabeth Streets¹⁶². In "Press Cuttings from the Newspapers of Fifty Years ago"¹⁶³, this venture of Beaumont and Waller is spoken of as the "small menagerie upon the racecourse."

In April, 1855, Secretary Angas applied to the Colonial Secretary for £5,000 to be placed on the Estimates towards completing the internal fittings of the North Wing¹⁶⁴, which received a gracious answer¹⁶⁵, but eventuated in only £2,000 reaching the Trustees¹⁶⁶ (Approp. Act 18 Vict. No. 34, 1855).

In the Annual Report for 1855 the completion of the gallery in the North Wing in the previous year was reported. The Report also says:—

"As soon as the Trustees were made aware that the Legislature had voted the sum of £3,000"

plans and specifications for cabinets and fittings were obtained¹⁶⁷, exhibited to the Board at the end of 1855, and a design having been agreed upon, the matter was placed in the hands of Capt. W. E. Ward for execution, and tenders ordered to be called for¹⁶⁸; the latter, however, appear to have been for only a portion of the work.

On the 1st September, 1855, Dr George Witt relinquished his Trusteeship¹⁶⁹. Dr. Witt was a member of the Old Committee, having been appointed by His Excellency Sir C. A. Fitzroy in September, 1852¹⁷⁰. He left the Colony to reside in London.

¹⁵⁹ Minutes, 2nd September and 7th October, 1854.

¹⁶⁰ Frontispiece.

¹⁶¹ *Syd Morning Herald*, 27th Aug., 1851.

¹⁶² 13th Sept. 1851.

¹⁶³ *Old Times*, i., 2, 1903, p. 100.

¹⁶⁴ Letter-book, i., p. 146.

¹⁶⁵ Minutes, 12th May, 1855; Document A $\frac{20.55}{26}$

¹⁶⁶ Letter-book, i., p. 151.

¹⁶⁷ Annual Rept. for 1855, p. 1.

¹⁶⁸ Minutes, 3rd November, 1st and 20th December, 1855.

¹⁶⁹ " 1st September, 1855.

10.52

¹⁷⁰ Document, B $\frac{10.52}{5}$

A great loss was sustained during 1856 through the death of Rear-Admiral Phillip Parker King, R.N., on the 26th February; he had served as Committeeman and Trustee for more than twenty years¹⁷¹. The vacancy thus caused on the Board was filled by the election of Randolph John Want, Esqr., on 5th April.

The Honourable H. W. Parker who had filled the office of Crown Trustee since August, 1853, resigned that position in October, 1856, in consequence of becoming Colonial Secretary, an office carrying with it the position of an Official Trustee. He was succeeded as Crown Trustee by the Honourable Edward Deas Thomson, Esqr., in January, 1857¹⁷², a member of the old Committee.

Notwithstanding the completion of the gallery as announced in the Annual Report for 1855, this unfortunate North Wing does not appear to have been completed even by September, 1856, for it lacked a staircase to the gallery, flagging and drainage to the cellar, the hall ceiling unpainted¹⁷³, and general want of ventilation. To rectify all this the sum of £2,000 was placed on the Estimates for 1856¹⁷⁴. Dilatoriness supreme appears to have been the order of the day, for by 1864 affairs remained in an unfinished state, judging by a letter from Mr. Krefft to the Colonial Secretary in August of that year, asking that a floor be laid down¹⁷⁵.

No more hopeless muddle appears to have been made in the affairs of the Museum than the casing and fitting up of the hall and gallery. They seem to have been commenced in the early part of 1856, and the work continued well on into 1863. The fittings in question consisted of enclosing the intermediate pillar spaces on the floor of the hall with glazed framings, cabinet cases with glass tops on the floor, and glazed wall cases around the gallery¹⁷⁶. These fittings were in existence when I joined the Museum Staff, and I must say they were anything but works of art! To provide these fittings an appropriation was passed by the Council in 1856 for £3,000¹⁷⁷ and three contracts for their construction were let at £568, £857, and £1,387 respectively¹⁷⁸. The Annual Report just quoted then says:—

“The internal fittings of the great hall being thus brought to a state approaching completion, etc.”

¹⁷¹ Minutes, 8th March, 1856; Ann. Report for 1856 (1857), p. 1.

¹⁷² Ann. Rept. for 1856 (1857), p. 2; Document B $\frac{15\ 57}{2}$; Minutes 7th Feb., 1857.

¹⁷³ Minutes, 2nd February and 18th September, 1856.

¹⁷⁴ „ 18th September and 4th October, 1856.

¹⁷⁵ Letter-book, ii., p. 183.

¹⁷⁶ Document A $\frac{20\ 56}{28}$; Minutes, 15th March, 3rd May, 5th and 12th July, 1856.

¹⁷⁷ Minutes, 8th March, 5th April, 1856.

¹⁷⁸ Minutes, 3rd May, 5th July, 1856; Letter-book, i., p. 160; Annual Report for 1856 (1857), p. 1.

In 1857 a further £2,000 was passed to the Trustees' credit, and this enabled them to complete those services detailed¹⁷⁹ at an expenditure of £1,650. It was finally arranged that a series of glass cases were to be constructed and fixed around the gallery balustrade for the purpose of displaying the minerals¹⁸⁰.

The subject of By-laws first took shape on 3rd March, 1855, when Mr. George Macleay moved, and the Hon. H. W. Parker seconded, that a Committee be formed:—

"To prepare a code of Bye-laws for the conduct of the affairs of the Museum."

These were passed by the Executive Council on the 14th April following¹⁸¹, and in the letter accompanying the approved copy the Colonial Secretary reminded the Trustees, in accordance with the 8th clause of the Act 17 Vict., No. 2, that the:—

"Museum Bye-laws must be published in the 'Government Gazette' within one month from the date thereof."

A copy was ordered to be engrossed and forwarded to His Excellency the Governor and His Executive Council.

The following are the By-laws in question, and it will be noted that in some respects they are similar to those now in vogue, in others much more drastic:—

Bye-Laws of the Australian Museum, 1855¹⁸².

Meetings of Trustees.

1. The ordinary meetings of the Trustees shall be held as early as possible in each month, on such day of the week, and at such hour, as shall be agreed upon by the Board.
2. Any Official meeting may be held, at not less than two days notice, on a requisition signed by Three Trustees being lodged with the Secretary; provided that, in such requisition, the object for which the meeting is to be called be specified.
3. Every meeting, ordinary or special, may be adjourned, at the pleasure of the majority of the members present, to any future day at their discretion.

Vacancies in the Office of Elective Trustees.

4. The office of Elective Trustee may be vacated by resignation, by absence from the meetings of the Board, without leave, for six successive months, after the month of February, 1855, or by ejection as hereinafter provided¹⁸³.

¹⁷⁹ Annual Report for 1857 (1858), p. 1; Letter-book, i., p. 171.

¹⁸⁰ Minutes, 2nd April, 1863.

¹⁸¹ Document A $\frac{11.55}{3}$

¹⁸² " "

¹⁸³ This By-law was passed on 10th February, 1855 (Document A $\frac{11.55}{2}$;

Letter-book, i., p. 143), and is still in existence, but in January 1858, it was altered to three months (Documents A $\frac{11.58}{4}$ and A $\frac{11.58}{5}$)

5. If any Elective Trustee shall contumaciously disobey any bye-law or order of the Board, or shall by word or writing publicly defame the Museum, or dishonestly do anything to its injury, he shall be liable to ejection by the Board.
6. Whenever there shall be cause for the ejection of any Elective Trustee, it shall be the duty of the Chairman, on the requisition in writing of Two Trustees, to propose at some meeting of the Board the ejection of such Trustee; and at the next ordinary meeting—previous notice thereof having been given him—the question shall be put to the Ballot, and if two-thirds of the members present vote for it, the Chairman shall cancel the name of such person in the list of Trustees, and the ejection of every such person shall be recorded in the Minute Book of the Museum.
7. As soon as a vacancy in the office of Elective Trustee shall have been declared ex cathedra by the Chairman, it shall be competent for any Two Trustees to propose the admission of a candidate for the office of Elective Trustee; provided that, at the time, the qualifications, scientific, literary, or otherwise, which such candidate may possess for the office, be stated in writing and signed by such Trustee.
8. At the next ordinary meeting after the Candidate has been so proposed, the election shall take place by Ballot; provided that no person shall be declared elected, unless he have in his favor two thirds of the members balloting.

Honorary Correspondents.

9. It shall be competent for the Trustees from time to time to elect Honorary Correspondents of the Museum.
10. Each certificate proposing a candidate for election as an Honorary Correspondent shall be signed by two or more Trustees, and shall specify the services which such candidate may have rendered to the Museum, or to the general cause of science; and such certificate having been presented at one of the ordinary meetings of the Trustees, the Election shall take place by Ballot at the next ensuing meeting of the Board; provided that no person be considered as duly elected unless he have in his favor two thirds of the members voting.
11. There shall be transmitted to each Honorary Correspondent, as soon as may be after his Election, a diploma under the Common Seal of the Museum (Fig. 16) signed by the Chairman for the time being, and countersigned by the Secretary.

Administration of Finance.

12. Some one Bank in Sydney shall be appointed Treasurer of the Museum.
13. At every ordinary meeting of the Trustees, an account shall be presented and entered on the Minutes, of all expenses incurred during the preceding month, including all salaries and wages; and the same, when audited and found correct, and countersigned by the Chairman for the time being, shall be paid by cheque or cheques drawn on the Treasurer, and signed by Two Trustees.
14. In cases of urgency, any three members of the Board may, by cheques countersigned by the Secretary, direct the payment of any account; every such cheque to be reported to the Board at its next meeting, and noted in the Minutes with the cause of the proceeding.

The Common Seal.

15. The Common Seal of the Museum shall be kept in a chest having three locks, with three different keys, of which two shall be in the custody of Trustees appointed by the Board, and the third shall be kept by the Secretary.
16. Every document to which the Common Seal of the Museum is to be affixed, shall be sealed at a meeting of the Board, and signed by the Chairman for the time being, and countersigned by the Secretary.

(Sgd.) Phillip P. King, L. King, W. S. Macleay, Alfred Stephen, J. Smith,

In February of this year a Committee previously appointed for the purpose, brought up its report¹⁸⁴ :—

“Regulations of the Official Conduct of the Secretary of the Australian Museum.”

Honorary Secretaries existed to the date of the Act of Incorporation in 1853, but thence onwards the Secretary was a paid servant. In the report of a Committee appointed on 9th July, 1853¹⁸⁵,

“To draw out such rules and regulations as may be immediately required for carrying into effect the provisions of the Act of Incorporation.”

The appointment of a Secretary was referred to as follows¹⁸⁶ :—

“Much of the anticipated advancement of the Museum depends on the judicious appointment of this officer. The requirements are such as are not ordinarily combined in one individual, who, in addition to a good share of classical attainments, ought to possess facility in correspondence, aptitude in business, correct and punctual habits, and withal a certain amount of enthusiasm in natural history and a love of the arts generally.”

Amongst the Secretary's duties provided for in the “Regulations” of February, 1855, as above, are¹⁸⁷ :—

“To arrange and catalogue such portions of the General Collection of the Museum as shall be allotted to him for the purpose, to make drawings of such animals or fossils as shall be indicated to him for the purpose by written request from any one of the Committee of Three Trustees hereafter to be appointed.”

During official hours the Secretary was not to engage in any other work than that connected with his office “under no pretext whatever.”

At a later period, in November, 1858, it was decided that the Secretary¹⁸⁸ :—

“Should be entrusted with the general charge of the Institution and the supervision of the other Officers connected with it.”

But this was overridden by a subsequent resolution passed when considering the terms of appointment of a successor to Mr. Wall in March, 1859 :—

“A suitable person to fill the office of Curator, and take charge of the Australian Museum¹⁸⁹.”

¹⁸⁴ Minutes. 10th February, 1855; Document A $\frac{11.55}{1}$

¹⁸⁵ „ 9th July, 1853.

¹⁸⁶ „ 30th July, 1853; Document A $\frac{10.53}{3}$

¹⁸⁷ „ 10th February, 1855; Document A $\frac{11.55}{1}$

¹⁸⁸ Document A $\frac{10.58}{8}$, 18th November, 1858.

¹⁸⁹ Minutes, 3rd March, 1859; Document A $\frac{10.59}{10}$

On the resignation of Mr. G. F. Angas in 1853 or soon after, the Secretaryship, as a separate office, was abolished, and combined with the Curatorship in one person¹⁹⁰.

Doubt arose in the minds of the Trustees whether their trust-custody extended to the specimens contained in the Museum prior to the Act of Incorporation in July, 1853. It was accordingly resolved on 2nd June, 1855, to address a letter to the Governor-General¹⁹¹:—

“Requesting His Excellency to make over to the Trustees the collection of specimens of Natural History which was contained in the Museum prior to the Act of Incorporation.”

This request was favourably considered and the whole contents of the Museum incorporated in one series¹⁹².

At the meeting of 1st August, 1855, the seats of Messrs. William Macarthur and A. M. a'Beckett were declared vacant. To replace these gentlemen, the following were elected on 6th October, 1855:—His Excellency Sir William Thomas Denison, Kt, Governor-General of the Australian Colonies; Rev. John Woolley, D.C.L. (Oxon), Principal of the University of Sydney; and Edward Wolstenholme Ward, Esqr., Captain of the Royal Engineers, and Deputy-Master of the Sydney Branch of the Royal Mint.

A revival of the practice of Exchanges took place in May, 1856, circulars being sent to no less than forty-nine European, two African, three South American, and five North American Museums soliciting specimens¹⁹³.

The Trustees, for some unexplained reason, were dissatisfied with the Act of Incorporation, and on 10th December, 1856, the Colonial Secretary was communicated with and informed that “anomalies” existed in the Act, and an amendment was requested. This, however, the Governor-General (Sir W. T. Denison) did not think it expedient just at that time and the matter dropped¹⁹⁴.

The first announcement of opening the collection to the public since removal from the “Old Court House” at Darlinghurst appears to have been made in August, 1850¹⁹⁵, notwithstanding the incomplete condition of the building; Mondays and Fridays were the selected days. How long this continued is unknown, but on 25th May, 1857¹⁹⁶, the public were

¹⁹⁰ Document A $\frac{10.60}{1}$

¹⁹¹ Minutes, 2nd June, 1855; Letter-book, i., p. 153.

¹⁹² „ 7th July, 1855.

¹⁹³ „ May, 1856.

¹⁹⁴ Document G $\frac{10.56}{7}$

¹⁹⁵ Minutes, 3rd August, 1850.

¹⁹⁶ „ 2nd May and 6th June, 1857.

admitted for one week, and it is recorded that during that time 12,000 visitors attended, a by no means bad attendance for those days. From this time onward the days and hours of visitation were being constantly altered.

In May, a Foreign Correspondence and Exchange Committee was formed¹⁹⁷. The first members were the Hon. R. J. Want, Hon. H. W. Parker, W. S. Macleay, and Dr. Woolley. Again in the same month the "Finance Committee" was resuscitated¹⁹⁸ in the persons of Captain E. W. Ward, R.E., Prof. J. Smith, and W. C. Mayne, Esqr. (Auditor-General). Such a body first appeared in March, 1855, to "furnish a statement of the expenditure of the funds of the Museum¹⁹⁹." The new Committee was instructed to "show a balance sheet at every monthly meeting."

The Hon. R. J. Want resigned his Trusteeship, to which he had been elected in April, 1856, in December, 1857, and was replaced by Sir William Macarthur, Kt., elected 6th February, 1858.

It would appear that upwards of eight years had been allowed to pass without providing a proper water supply, for on the 13th October, Secretary Angas wrote to the Trustees of the Sydney Grammar School inviting them to join in an application to have connection made with the main in Stanley Street.

In the Annual Report for 1856, the Trustees called the Governor-General's attention to the very limited accommodation which the Museum afforded in its then state for the proper display of the various collections²⁰⁰, and again threw themselves on the liberality of the Government for means to extend the building.

In August, Mr. Angas forwarded to the Colonial Secretary (Honorable H. W. Parker) for His Excellency's consideration plans prepared by the Government Architect (either William or Alexander Dawson) and adopted by the Board for the above purpose, inclusive of the "proposed entrance from Hyde Park²⁰¹." This last sentence clearly indicates this as the inception of the West or College Street Wing, and fixes the year as 1857. This application met with no cordial response, the Council expressing its regret that owing to the condition of the public funds it was unable to comply with the request²⁰².

¹⁹⁷ Minutes, 2nd May, 1857.

¹⁹⁸ " 2nd May, 1857.

¹⁹⁹ " 3rd March, 1855.

²⁰⁰ Also Annual Report for 1858 (1859), pp. 2-3.

²⁰¹ Minutes, 11th July and 1st August, 1857; Letter-book, i., p. 166;
20.57

Document A

29

10.57

²⁰² Document G

8

This want of space was brought home to the Trustees in all probability by the investigations of a Committee appointed to "Report on the appropriation of the different rooms in the Museum," between the various officials²⁰³. Amongst other incongruities noticed was the occupation of the "Board Room" or "Council Chamber" by several of the busts presented by Sir Charles Nicholson, which the Committee regarded as "incompatible" with its proper occupation. It is probable that the following extract from the Committee's Report was the germ idea for the erection of the West Wing:—

"Your Committee are of opinion that the only mode of providing properly for the Statuary and other specimens deposited in the Museum will be by making additions to the present building on a scale which may be sufficient for the wants of the Institution for some years to come."

Nothing eventuating from the Trustees' application, the Governor-General took the matter in hand and addressed the following letter²⁰⁴ to his Co-Trustees:—

Govt. House,
2 October, '58.

Sir,

Will you, if it be in accordance with the rules of the Museum, give notice to the Trustees that I propose to bring under their consideration at the next meeting the propriety of drawing up a petition to the Govt. praying that a sum may be placed on the Estimates of 1859 for the erection of additional buildings in accordance with a plan formerly submitted to the Govt.²⁰⁵, the object of such addition being to enable the Trustees to classify and arrange the rapidly increasing number of specimens in the different departments of Natural History, to keep each Department separate and distinct so as to enable the public to visit some pictures at all events of the Museum on every day of the week excepting Sunday; to provide a room for the books which the liberality of the Legislature has enabled the Trustees to purchase; and generally to give to the building a character and appearance which its importance as a branch of the Educational Institutions of the Colony calls for.

Yours,

(Sgd.) W. Denison.

Needless to say this was adopted, and a request sent accordingly²⁰⁶. Even this intervention of His Excellency does not appear to have proved effectual for we find him in August, 1859²⁰⁷, proposing a fourth attempt. This brought forth the pleasing reply from the Colonial Secretary²⁰⁸ that it was proposed by the Government to place on the Estimates the sum of £5,000 for the ensuing five years, in addition to a further similar sum included on the 1859 Estimates for a like purpose.

²⁰³ Document A $\frac{10.57}{6}$

²⁰⁴ Minutes, 4th November, 1858; Document A $\frac{10.58}{7}$

²⁰⁵ These were approved by the Trustees on 8th August, 1857.
20.58

²⁰⁶ Minutes, 2nd December, 1858; Document A — 31

²⁰⁷ „ 4th August, 1859.

²⁰⁸ Document A 20.1861.

Nothing, however, of a practical nature appears to have resulted until the middle of 1861, for in May a Committee report²⁰⁹ was presented to the Board in which it suggested that the whole of the walls, roofs, and floors of the entire wing be erected, followed by the fittings for the two northern and central rooms²¹⁰.

In their Annual Report for 1861, the Trustees stated they had the satisfaction of reporting that the additions to the Museum were in progress²¹¹. The architect of the New Wing was either Mr. William or Mr. Alexander Dawson, but it was clearly completed under the direction of Mr. James Barnett. Mr. Thomas Barnett informs me that the architecture of the high central portion is "Corinthian Classic," and the wings would be best described as "Italian Renaissance." Mr. James Barnett was Acting Colonial Architect during 1863-65, and occupied the full position from 1866 to 1890, when the title of his office was changed to that of Government Architect.

This western façade of the building evidently met with approval, for we read in "Lawrence Frost's Compendium of his Views of Australia" (no date) that this front :—

"Shows one of the most classic and well-proportioned specimens of architecture to be seen in Sydney."

Again, in "William Maddocks' Visitors' Guide to Sydney," 1872, is the following flowery description :—

"The building is a large, massive, and beautiful edifice, of a bold style of Roman or Grecian architecture The site of the building required a style of architecture which would be effective when viewed from a great distance. The tympanum of the pediment has been left plain, some day it will probably be graced with a colossal emblematical group. Internally the ground and first floors of the new building are about 200 feet in length, 35 feet wide, and 23 feet high; each gallery being divided into five compartments by means of Corinthian columns."

The practice of exhibiting all new material or, at any rate, as much of it as possible at Board Meetings, first came into vogue in February, 1858, by resolution, and has continued ever since²¹². Books had now been acquired either by purchase in a moderate way, or by gift, from the time of the first arrival of the Collections in College Street, but the first indication of library activities proper occurred in August, 1856²¹³, when the Secretary was instructed to prepare a list of all the books in the Trustees' possession, and a trifle later a Library Committee was formed. These transactions unquestionably formed the nucleus of the magnificent Library now connected with the Institution. In the Annual Report for 1858²¹⁴ it was reported that £140 had been allotted for erection of book

²⁰⁹ Minutes, 2nd May, 1861; Document A $\frac{20.61}{32}$

²¹⁰ „ 2nd May and 1st August, 1861; Letter-book ii., p. 2.

²¹¹ Annual Report for 1861 (1862), p. 2.

²¹² Minutes, 6th February, 1858.

²¹³ „ 2nd August, 1856.

²¹⁴ Annual Report for 1858 (1859), p. 2.

cases in the Board Room, but this erection was long delayed as usual; Swainson's Library was also purchased from his widow. Somewhat later £500 was granted to be spent in London on behalf of the Trust by Dr. G. Bennett, Mr. G. Macleay, and Professor Owen²¹⁵.

The arrival of the Austrian Frigate "Novara," on a supposed scientific expedition around the world, gave a stimulus to the Exchange activities of the Trustees and enabled them:—

"to open communication with the Austrian Government and the Imperial Museum at Vienna."

A large general collection was handed over to the ship's officers²¹⁶. At the same time from the British Museum were received the following important replicas, skulls of the *Sivatherium giganteum*, South American Ground Sloth (*Megatherium giganteum*), Cave Bear (*Ursus spelæus*), and the foot of the Dodo (*Didus ineptus*). Exchange matters were in fact progressing so satisfactorily that it became necessary to appoint a London agent "for the transmission of books to and from the Continent of Europe" in the persons of Messrs. Flower and Co., afterwards Flower and Salting.

The seat of Frederick Orme Darvall, Esq., who was a member of the first Board in 1853, lapsed in September, 1858, and to fill the vacancy Alfred Roberts, Esq., Surgeon, was elected in October²¹⁷.

Shortly after the adoption of the new By-laws advantage was taken of the 9th and 10th to elect Mr. Lindsay Buckle Young, of Gladstone, Queensland, an Honorary Correspondent of the Museum, in recognition of his liberal donations of specimens²¹⁸. In July of the next year (1857) Frederick Raynor, Esq., Surgeon of H.M.S. "Herald," Captain Denham, and John Denis Macdonald, Assistant-Surgeon of the same vessel, were similarly elected²¹⁹. All these gentlemen had performed excellent investigations in marine life, and the Museum gained much benefit thereby²²⁰. Another valued Correspondent was Frederick Neville Isaacs, Esq., of Gowrie, Darling Downs, elected in recognition of his energetic collecting of fossil bones from the Post-Tertiary deposits of South-east Queensland²²¹, amongst others that much disputed skull *Zygomaturus*

²¹⁵ Minutes, 4th November, 1858, and 3rd March, 1859.

²¹⁶ Annual Report for 1858 (1859), p. 1.

²¹⁷ Annual Report for 1858 (1859), p. 2; Minutes, 7th October, 1858; 10.58

Document B —

11

²¹⁸ Minutes, 7th June, and 5th July, 1856; Letter-book, i., p. 163.

²¹⁹ „ 4th July, 1857; Annual Report for 1858 (1859), p. 2.

²²⁰ Assistant-Surgeon Macdonald was a particularly keen naturalist and wrote extensively. Some of his more important publications were—Anatomy of the Pelagic *Jasonilla*; that of *Nautilus umbilicatus*; of *Macgillivrayia*, establishing a new Order of Gasteropoda; on the Sea Saw-dust of the Pacific; deep soundings obtained by H.M.S. "Herald" in the South-west Pacific; a new form of Compound Tunicate; Anatomy and Classification of the Heteropoda; Anatomy of *Pirella*; metamorphoses of the Gasteropoda, and many other papers.

²²¹ Minutes, 5th March, 1858; Annual Report for 1857 (1858), p. 2; *Ibid.* for 1858 (1859), p. 2.

trilobus, Macleay²²². A diploma plate was engraved by Messrs. Allan and Wigley, Lithographers and Engravers, of Bridge Street (Fig. 16), the animal group at the head by Secretary Angas, so well known and appreciated for his artistic ability²²³.



AUSTRALIAN MUSEUM

*The Trustees of the Australian Museum, at their ordinary
monthly meeting on the - - - - -*

adjudged the title of
HONORARY CORRESPONDENT *of the Australian Museum to*
on account of - - - - -

*In testimony of which they have issued this Diploma at Sydney
on the - - - - - and have caused their seal to be
affixed thereto.* - - - - -

- - - - - }
- - - - - } *Seal of the*
- - - - - } *Australian*
- - - - - } *Museum*

FIG. 16.

The Rev. Robert Lethbridge King, a son of Admiral P. P. King, who was a member of the old Committee from 1848 onwards, and in consequence one of the first group of Trustees, resigned in December, 1857²²⁴. His seat was filled by the election of Alfred Denison, Esq., M.A., on 3rd March, 1858²²⁵.

The Curatorship of Mr. W. S. Wall terminated at the end of this year (1858), his retirement on 31st December being due to ill-health. (See Part i, p. 78.)

²²² See p. 360.

²²³ For instance his "South Australia illustrated" (roy. folio), 1846.

²²⁴ Minutes, 6th February, 1858; Document B ^{20.57} —; Letter-book, i., p. 181.
1

²²⁵ Minutes, 6th February and 3rd March, 1858.

Two Trustees who could ill be spared resigned at the beginning of 1859, in consequence of visiting Europe, Sir George Macleay and Dr. George Bennett, both members of the old Committee, their names appearing on the first collective list in 1836. Sir George resigned on 3rd February, 1859²²⁶, and was succeeded by Randolph John Want, Esq., who was elected 3rd March, for the second time²²⁷.

By now the collection of minerals must have reached respectable proportions and required overhauling and classification. A Dr. Gygax, apparently a German of sorts, happened to be in Sydney at the time and through the instrumentality of Mr. R. H. Want his services were engaged in August²²⁸; by October, however, the unfortunate man was dead²²⁹.

The Rev. W. B. Clarke resigned his Elective Trusteeship in March, 1859, but was again elected in January, 1861²³⁰.

On the retirement of Wall, the subject of his successor evidently became a burning question amongst the Trustees. The Governor-General (Sir W. T. Denison) as an Elective Trustee, interested himself in the matter and wrote Sir George Macleay, then in London, indicating very clearly the necessary qualifications of candidates for the office of Curator, etc.²³¹ On 3rd March²³², 1859, a resolution was passed commissioning George Macleay in conjunction with Professor Owen to select a suitable person. In due course (October 17th) this Committee forwarded the name of the gentleman selected in the person of Mr. Simon Rood Pittard, M.R.C.S., who, accompanied by his family, arrived in Sydney in the ship "Lansdowne" on 5th February, 1860²³³. He was instructed to devote himself exclusively to the duties of his office inclusive of the delivery of lectures on "the different branches of Natural History." These lectures were delivered in the Board Room²³⁴.

The retirement of Mr. Wall, the resignation of the Secretaryship by Mr. Angas as from 1st March, 1860²³⁵, and who had served in that capacity since July, 1853, with the arrival of Dr. Pittard, brought about a reorganisation of the staff. The Committee appointed for the purpose recommended the two offices of Curator and Secretary²³⁶ to be combined,

²²⁶ Minutes, 3rd February, 1859; Document 20.59 —; Letter-book, i., p. 200.
3

²²⁷ Annual Report for 1859 (1860), p. 2.

²²⁸ Minutes, 7th May and 4th August, 1859.

²²⁹ „ 6th October, 1859.

²³⁰ Letter-book, i., pp. 201 and 233.

²³¹ Document B.B. 20.59 —; Letter-book, i., p. 203.
5

²³² Document B. 10.59 —
10

²³³ Annual Report for 1860 (1861), p. 2.

²³⁴ Minutes, 15th June, 1860.

²³⁵ „ 7th December, 1859.

²³⁶ Document A — — —
10.60
1

Dr. Pittard to occupy the position, an Assistant Curator and Clerk in one to be appointed, Taxidermist and Messenger, and an Office-Keeper²³⁷. Pittard, previously known as Curator and Lecturer, was to assume the title of Curator and Secretary, although the lectures were not to be abandoned. His duties in full were defined as follows:—

“Should attend the Meetings of the Trustees; should keep the Minutes of the Board; be responsible for the care, arrangement and cataloguing of the property of the Museum, and give at least two courses of lectures per annum²³⁸.”

However, poor Pittard did not live long to enjoy his honours; he died of consumption on 19th August, 1862²³⁹.

The gentleman selected to fill the position of Assistant Curator and Clerk was a German, Johann Louis Gerhard Krefft; the date of his appointment was 15th June, 1860, and his position was defined as:—

“Under the direction of the Secretary and Curator for the purpose of copying the Minutes and Correspondence of the Board, and for arranging the specimens in the Museum²⁴⁰.”

On Pittard's death he automatically gravitated into the position of Acting Curator and Secretary²⁴¹.

Amongst the numerous applicants for the Curatorship at the time of Pittard's selection was Henry Edwards, the Actor, a well known Entomologist, and “all round Naturalist,” whose application²⁴² was dated “Sydney, February 2nd, 1860;” the writer of this account had the pleasure of Edwards' acquaintance.

The Pittard family returned to England in October, 1861, passages having been provided by the Government²⁴³.

The Governor-General (Sir W. T. Denison) resigned his Trusteeship 3rd January, 1861²⁴⁴, when an address was prepared. The Board has never had, as one of its members, a more active and zealous colleague, who did everything in his power to advance the interests of the Institution. Amongst many of the matters brought forward by him was the appointment of a Collector, whose whole time was to be employed out of doors; the remarks made on this occasion by His Excellency show him to have been a keen student of practical zoology. He also suggested the immediate commencement of a “Catalogue of the Specimens in the

²³⁷ Minutes, 15th March, 1860.

²³⁸ „ 15th March, 1860.

²³⁹ „ 22nd August, 1861; Annual Report for 1861 (1862), p. 1.
30.60

²⁴⁰ Minutes, 15th June, 1860; Document B.B. —
2

²⁴¹ Annual Report for 1861 (1862), p. 1; Minutes, 23rd August, 1861.

²⁴² Document H 10.50.

²⁴³ Minutes, 3rd October, 1861.

²⁴⁴ „ 3rd January, 1861,

Museum," with a view of aiding Exchanges²⁴⁵; Angus was instructed to commence one of Shells, and Wall another of Birds. Sir W. T. Denison was also responsible for the addition of lists of all specimens obtained either by exchange or donation to the Annual Report saying²⁴⁶:—

"We shall then be in a position to show that an additional Building is a matter of necessity."

In January, 1859, Sir William further proposed the preparation of a:—

"Brief set of plain and practical instructions for collecting and preserving the various specimens of Natural History for general circulation throughout the Colony²⁴⁷."

It was, however, discovered that Mr. John Macgillivray had already prepared and published such instructions, under the title of:—

"Hints on the Preservation of Specimens of Natural History, intended for Country Residents²⁴⁸."

These were adopted by the Board, but only a limited number could have been issued; a copy does not exist in the Museum Library. The appearance of the lists in the Annual Reports just referred to continued for many years, in fact until 1899, when the practice was discontinued.

Previous to 1860 the Endowment of £1,000 represented the income of the Museum, other than special votes for purchases and what not, but in 1857 the Trustees were promised an additional £200 to supplement the then existing Annual Endowment²⁴⁹. This, however, did not eventuate until early in 1860²⁵⁰.

The Governor-General's resignation was followed by that of his relative, Alfred Denison, Esq., M.A., on the 1st March, 1860²⁵¹, who had served since March, 1858. His seat was filled by the election of Sir John Hay, K.C.M.G., M.A., elected on the same day.

The seat vacated by Sir William Denison was filled by the election of William John Macleay, Esq., on the 7th March, 1861. Professor J. Smith resigned in December, 1860²⁵², and was succeeded by Dr. George Bennett in January, 1861, a re-election²⁵³. Sir William Macarthur's Trusteeship lapsed in December, 1861²⁵⁴, creating a vacancy filled in the

²⁴⁵ Minutes, 2nd June, 1858.

²⁴⁶

²⁴⁷ " " " " 3rd February, 1859.

²⁴⁸ Cox and Co.'s Australian Almanac for the year 1857 (8vo., Sydney), pp. 90-98.

²⁴⁹ Documents 57/3777, G $\frac{10.50}{1}$

²⁵⁰ Minutes, 15th March, 1860.

²⁵¹ " 7th December, 1860, and Document B $\frac{10.60}{15}$

²⁵² " 6th December, 1860.

²⁵³ Annual Report for 1860 (1861), p. 2.

²⁵⁴ Minutes, 5th December, 1861.

following February, by W. J. Stephens, Esq., M.A., late Fellow of Queen's College, Oxford, and Head Master of the Sydney Grammar School²⁵⁵.

- The address spoken of before was made to His Excellency at a levee held on the 19th January. The all-important paragraph to us is the following²⁵⁶ :—

"We are very sensible of the very valuable services which you have invariably rendered to it [the Museum] and to the Cause of Science generally during the whole period of Your Excellency's administration of the Government. Your constant attendance at the meetings of the board, the anxious desire which you have ever evinced to promote in every possible way the Scientific objects which the institution is designed to foster; the courtesy which has at all times distinguished Your Excellency when presiding at the Trustee meetings, and your numerous valuable donations to the institution all constitute claims on our gratitude, which we feel it to be our duty to acknowledge in terms of unqualified satisfaction."

Amongst the more important acquisitions made about this time was that of a collection of minerals and ores from Mr. Louis Saemann, of Paris, which arrived in 1861. The purchase was recommended by the Rev. W. B. Clarke, the Legislature having granted a special appropriation of £200 for the purpose²⁵⁷.

After the death of Mr. Pittard a heated discussion, extending over a long period, took place between the Trustees and the Government as to the body responsible for the appointment of a Curator. This appears to have commenced by the Colonial Secretary (Honourable Charles Cowper) requesting to be informed²⁵⁸ of the manner in which the vacant position might be advantageously filled. The Trustees in reply stated their intention of taking immediate steps to fill the vacancy²⁵⁹. In the Colonial Secretary's reply occurred this significant passage :—

"You will . . . understand that any arrangement proposed will be subject to the approval of the Government²⁶⁰."

To this the Trustees, under date of 5th December, replied by quoting the 7th clause of the Act of Incorporation, which gave, and still gives them power "to appoint all Officers and servants of the Museum²⁶¹." The Colonial Secretary interpreted this clause very differently by restricting the Trustees' privilege to those appointments²⁶² :—

²⁵⁵ Annual Report for 1862 (1863-4), p. 1; Minutes, 6th February, 1862; Letter-book, ii., p. 46.

²⁵⁶ Annual Report for 1860 (1861), p. 2; Letter-book, i., p. 235.

²⁵⁷ Minutes, 15th June, 1860; Letter-book, ii., p. 15.

²⁵⁸ Letter of 31st Oct., 1861; Minutes, 7th Nov., 1861; Document B.B. $\frac{40.61}{1}$

²⁵⁹ Minutes, 8th November, 1861; Document B.B. $\frac{40.61}{2}$

²⁶⁰ ,, 2nd December, 1861; Documents 61-4745 and B.B. $\frac{40.61}{3}$

²⁶¹ Document B.B. $\frac{40.61}{17}$; Letter-book, ii., p. 25.

²⁶² Letter of 11th December; Documents 61/5179 and B.B. $\frac{40.61}{9}$

"For which salaries are provided out of the Endowment granted by the 3rd section of the same Act. But the office of Curator, having been created subsequently to the passing of that Law and the Stipend appropriated by a special vote of the Legislature, must be considered as coming under the 37th clause of the Constitution Act, which vests all appointments in the Governor and Executive Council."

During this year the greatest benefactor of Natural Science Australia has yet seen, joined the Board—William John Macleay—in March, 1861²⁶³, one widely known for his public and private munificence and scientific attainments.

The Trustees again wrote in January stoutly maintaining their right to the appointment of all persons in their employ, and asking permission to send a deputation from their body to discuss the matter with the Colonial Secretary²⁶⁴. To neither the letter or the request to be received was any answer sent until 27th March, when the Colonial Secretary not only reiterated his former arguments, but adduced others in support of his contention, and finally declined to give way²⁶⁵. After further correspondence, a Sub-Committee appointed by the Trustees drew up certain resolutions which were forwarded to the Government.

It will clear the stage for further proceedings of a like nature, should such ever arise, if these be quoted *in extenso*.

1. That by the Act of Incorporation the appointment of all the officers of the Institution is by law invested in them only.
2. That the Trustees are of opinion, that the Legislature having voted an amount for Salary of Curator whilst this law existed, must be taken to have granted it with the knowledge that the appointment should rest with the Trustees, and therefore that they are entitled to the disposition for that purpose of the amount so voted.
3. That independently of the question as to the right of appointment of the Curator, which of course also confers the right of dismissal, the Trustees are of opinion that they would not have that control over an officer not appointed by them which would be essential to the due management of the Museum.
4. That the Curator is not an officer of the Government but officer of an Institution endowed by the Parliament in the same manner as the University, the Benevolent Asylum, the Sydney Infirmary, and similar Institutions.
5. That the Government has already recognised the right of the Trustees to appoint the Curator. In the case of Mr. Pittard this appointment was made by them through the instrumentality of His Excellency, Sir W. T. Denison, acting as one of the elected members of the Board, and not as Governor-General, as communicated by their Secretary's letter to you, from which the following is an extract:—
 "I am directed by the Trustees to inform you that, having trusted
 "the selection of a competent gentleman to fill the office of Curator
 "to Professor Owen and Mr. George Macleay, they have after much
 "trouble and enquiry chosen Mr. S. R. Pittard, a member of the
 "Royal College of Surgeons of London and Demonstrator of Anatomy
 "at the Grosvenor Place School, as the most eligible of candidates
 "who presented themselves for appointment."

²⁶³ Minutes, 7th February and 7th March, 1861.

²⁶⁴ ,, 2nd and 9th January, 1862; Letter-book, ii., p. 85.

40.62

²⁶⁵ Documents 62/86 and B.B. ———

The Colonial Secretary's reply of the 24th February, 1860, acknowledged the receipt of the above letter and in his second paragraph states as follows:—

"In reply I am directed by the Colonial Secretary to state, that no payment can be allowed except the sums actually agreed to or paid by the gentlemen who undertook to make the engagement."

The Trustees consider that it is clear from this correspondence that the right of the Trustees was not disputed by the Government.

6. That with respect to the despatch addressed by His Excellency, Sir W. T. Denison to the Secretary of State and the reply to that despatch, it is sufficient to state that neither the Board nor any of its members were aware of either of them, and that no copy of that reply stated to have been forwarded to them has ever been received by the Trustees.
7. That the Trustees regret the determination which the Colonial Secretary has arrived at as the non-appointment of a Curator at a time when his services are particularly required must materially injure not only the Institution but the Public by depriving them of the lectures the Curator would give.
8. The Trustees cannot for the reasons hereinbefore given consent to incur the responsibility of managing an Institution with an officer who would in fact be independent of their control, and they therefore cannot admit the right of the Government to the appointment nor indeed the policy of vesting it in any other body but the Trustees.
9. Under the circumstances the Trustees must endeavour to the best of their ability to carry on the Institution with the present Acting Curator who also fills the office of Secretary and whose joint occupation will necessarily prevent him from devoting all that care as Curator which the Museum imperatively demands. The blame should the Institution not prosper as the Trustees would desire will not rest with them.
10. The Trustees are under the impression that the Government only refuse to them the right of the appointment of Curator from a belief that the Constitution Act of the Colony renders it imperative on the Government to nominate such an officer, an interpretation of the law in which this Board cannot concur. They would suggest however to the Colonial Secretary that in order to solve the difficulty the Government should place the amount of the Salary of the Curator on the ensuing Estimates as an addition to the endowment fund indispensable to the proper management of the Institution.
11. The Trustees are extremely anxious to procure the services of a thoroughly qualified Curator, and if the salary be granted propose to request two or more of the most distinguished naturalists in England to select such a person for the appointment. At present they have heard of no person qualified for the office.

And here the matter rested, to all intents and purposes, for upwards of two years, in fact, until the 28th April, 1864. In the meantime the Trustees expressed their annoyance and difficulties as follows²⁶⁶:—

"The Trustees have with much regret to report that the Museum is suffering from the want of the services of an efficient Curator, though the Legislature has voted a liberal sum for the salary of such an Officer. . . . The Trustees have been withheld from proceeding to obtain a Curator by the refusal of the Government to recognise the right of the Trustees to appoint such an Officer, or even to make arrangements for the selection of an individual to fill that office."

However, on the 28th April, 1864, a change came o'er the scene, nothing less than a complete surrender on the part of the authorities, in these words²⁶⁷ :—

"The Crown Law Officers, who have been consulted on the point, have advised that the Office of Curator should be left in the hands of the Trustees of the Museum."

The Trustees naturally expressed their gratification²⁶⁸ that the Executive Council had at last recognised as a principle the position they had so long maintained. Their letter concludes with these words :—

"The Trustees have had no hesitation in electing Mr. Gerard Krefft who has been in sole charge of the Museum since August, 1861, (having been also engaged as Assistant since June, 1860), and has during the whole of this period given the most satisfactory evidence of energy, ability, and enthusiasm, in his work²⁶⁹."

At the same time an Assistant-Curator of "considerable practical experience in the person of Mr. George Masters" was appointed²⁷⁰.

About the middle of 1861 the Trustees were appealed to by the Commissioners of the International Exhibition to be held in London in 1862 for co-operation in the supply of specimens of Natural History. The Trustees declined to assist, and offered the Commissioners a very sensible piece of advice²⁷¹, viz.:—

"Send into the interior persons properly qualified to collect and arrange Zoological and Mineralogical Specimens."

A survival, at the present time, is that of a rule passed in November, 1861, through the instrumentality of Alfred Roberts, Esq., by which no servant of the Trust is allowed to sell or otherwise deal in specimens or collections such as are represented in the Museum.

The year 1862 was remarkable for the number of changes that took place on the Board. The seat of John Hay, Esq., M.L.A., lapsed in January²⁷², but he was re-elected in March²⁷³ to succeed Charles Nicholson, whose seat had lapsed in the previous February, Mr. Hay's position becoming occupied by Edward Smith Hill, Esq., in March²⁷⁴,

²⁶⁷ Documents 64/2290 and B.B. $\frac{40.64}{14}$

²⁶⁸ Document B.B. $\frac{64}{13}$; Letter-book, ii., p. 156, 5th May, 1864. The full correspondence will be found in the "Votes and Proceedings"—"Curator of Australian Museum (correspondence respecting appointment of)," 35A., 1862.

²⁶⁹ Annual Report for 1864 (1865), pp. 1 and 2.

²⁷⁰ Minutes, 2nd June, 1864; Letter-book, ii., p. 155.

²⁷¹ " 6th June, 1861.

²⁷² " 2nd January, 1862; Annual Report for 1862 (1863-4), p. 1.

²⁷³ " 6th March, 1862; Letter-book, ii., p. 49.

²⁷⁴ " " " " " " " " ii., p. 48.

Colonial Architect James Barnet, who completed the West Wing, commenced by Colonial Architects Dawson, became an Official Trustee in December in virtue of his office²⁷⁵.

For twenty or more years that eminent Naturalist, William Sharp Macleay, gave his best energies to the welfare of the Institution. Committeeman from 1841 to 1853, Elective Trustee from 1853 onwards, ill-health compelled him to resign in January, 1862²⁷⁶. The Board presented him with an Address, a copy of which is herewith given.

"To William Sharp Macleay, Esq., A.M., F.L.S., etc., etc., etc.

Sir,

We the undersigned Trustees of the Australian Museum cannot allow the occasion of your resignation to pass without expressing to you the great regret with which we have learnt, that the state of your health has rendered the step imperative. We the more regret your retirement, because we are sensible of the value and prestige which appertain to your name as that of one who has largely contributed to the advancement of those objects of Science which the institution is intended to promote.

We gladly avail ourselves of the opportunity to record our high appreciation of the valuable services in which you have on all occasions rendered to the Institution during the long period, now extending over twenty years, that you have been a member of the Board.

We shall gladly avail ourselves of the further assistance which you have kindly proffered.

In conclusion we have much pleasure in expressing to you our earnest wish that with improved health you may long enjoy the solace of indulging in those Literary and philosophical researches which have gained for you a high reputation throughout the civilised world.

We have the honor to subscribe ourselves,

Sir,

Your most obedient humble Servants,

(Sig.)	George Bennett, M.D.	E. Deas Thomson, Chairman
	Alfred Roberts	George E. Turner
	R. J. Want	William J. Stephens
	William Macleay	Edward S. Hill."

The first regular proposal to keep Specimen Registers, as we know them now, seems to have emanated from Alfred Roberts, Esq., who in March carried the following resolution²⁷⁷ :—

"That it be the special duty of the Curator or Acting-Curator to keep or have kept a tabulated Account of all specimens received into the Museum which shall embody the following points and be laid before each Monthly Board Meeting.

1. Number in consecutive arrangement.
2. Name and habitat of Specimen (as near as possible).
3. Name of Donor or of person purchased from.
4. Date of presentation or of purchase.
5. Date of its being handed to the Sub-Curator or Taxidermist for preparation.
6. Date of its return to Curator.
7. Letter and number of place or compartment in which it is placed.
8. Ultimate destination."

²⁷⁵ Letter-book, ii., p. 73.

²⁷⁶ Minutes, 2nd January, 1862; Annual Report for 1862 (1863-4), p. 1.

²⁷⁷ „ 6th February and 6th March, 1862.

The present Registers are modelled more or less on the same lines as the foregoing.

A very important purchase was effected in 1862, that of Count d'Archaic's Collection of Mesozoic fossils²⁷⁸.

What may be termed the third Museum publication made its appearance during this year:—

“A Catalogue of Mammalia in the Collection of the Australian Museum, by Gerard Krefft, 1864²⁷⁹.”

The preparation of this work was first mooted in January²⁸⁰, and the completed M.S. laid before the Board in December²⁸¹. It has long been out of print.

In June, 1863, the Honourable A. W. Scott, M.L.C., well known for his fine but unfinished work, “Australian Lepidoptera and their Transformations,” joined the Board²⁸² in place of Sir John Hay, whose seat had again become vacant²⁸³.

I have previously related the preliminary steps that led to the commencement of the erection of the West or College Street Wing in 1861-2. In their Annual Report for 1866 (1867) the Trustees said:—

“The building will be ready within a short period for the reception of specimens.”

In the same document for 1867 (1868) reference is made to filling the new wing with cabinets, and finally in the 1868 occurs this statement:—

“The new wing has been open to the public since January, and the number of visitors has been largely increased, from 11,300 in 1860 to more than 100,000 persons during the past year²⁸⁴.”

The record of Mr. Krefft's appointment and the brief statement of the completion and opening of the West Wing will form a convenient halting point at which to bring this Part ii. of the Museum History to a close.

²⁷⁸ Minutes, 8th May, 1862.

²⁷⁹ 8vo., Sydney, 1864.

²⁸⁰ Minutes, 7th January, 1864.

²⁸¹ .. 1st December, 1864.

²⁸² .. 6th March and 4th June, 1863; Letter-book, ii., p. 105.

²⁸³ .. 7th April, 1863; Annual Report for year 1863 (1864), p. 1.

²⁸⁴ Also see S. T. Leigh and Co.'s “Handbook to Sydney and Suburbs,” 1867, p. 79.

APPENDIX.

Additions and Corrections to First Part.

DR. J. LHOTSKY (p. 71)—He was an expatriated Pole, and "had a cabinet in Elizabeth Street which was much admired for its scientific arrangement." From the "Australian Alps" he brought some auriferous sand. Mr. John Benson Martin "was one of the few who attended at Dick's, the silver-smith, to witness its reduction, and saw the first button of Australian gold turned out of its crucible²⁸⁵." From this it would appear that Lhotsky's discovery antedated that of his illustrious countryman, Strzelecki. He was referred to in the "Sydney Gazette"²⁸⁶ as a candidate for Holmes' place as Colonial Zoologist. He all but anticipated Strzelecki in the latter's exploration of Mt. Kosciuszko, for in a letter to the Editor of the "Sydney Gazette"²⁸⁷ from Jirabombra, on Limestone Plains, dated 5th April, 1834, he wrote:—

"Visiting many of the stations scattered about the interesting and important downs of *Menero*, I crossed the Snowy River, and brought my cart as far as Mutong, situated about 37° S.L., and 148° E.L. . . . and entered by *Westall's Opening* the very heart of the Australian Alps."

The position of this Mutong (which I cannot find on any map) from the latitude and longitude given, must be in Victoria, at some distance to the south of Mt. Kosciuszko. He goes on to say:—

"The 5th of March, at 8 A.M., I was on the top of Mt. William, the absolute altitude of which is, according to the preliminary calculations I was able to make at the time, from 5 to 7,000 feet, and therefore by far the highest point ever reached by any traveller on the Australian Continent."

In the "Sydney Gazette" of 7th and 9th February, 1833²⁸⁸, are advertisements of the approaching sale of his collections:—

"8,000 specimens of plants, many belonging to families seldom attended to by the botanist, together with a variety of woods, gums, classified rocks and other minerals, insects, etc., etc." [or] "*eight thousand specimens of Plants, Insects, Zoophytes, Minerals, Tympanum Bones of a Whale, Brazilian Snakes, Mosses, specimens of the various Woods of the Colony, Lizards, Fishes, and other Curiosities.*"

Dr. Lhotsky delivered lectures at Hart's Buildings, Pitt Street, on Mineralogy, Botany, and Zoology, in 1833, under vice-regal patronage²⁸⁹. In a sub-leader of the "Sydney Gazette," 18th June, 1833²⁹⁰, entitled "Colonial Museum," Lhotsky was advocated as the one to fill the post rendered vacant by the retirement of William Holmes (p. 75), who died

²⁸⁵ "Reminiscences," by J.B.M. [John Benson Martin] being a reprint from the *Camden Times* for 1883 (1884), p. 35.

²⁸⁶ *Sydney Gazette*, xxxiii., No. 2534, 26th March, 1835.

²⁸⁷ *Sydney Gazette*, xxxii., No. 2427, April 15th, 1834.

²⁸⁸ *Sydney Gazette*, xxxi., No. 2243, 7th February, 1833, No. 2244, 9th February.

²⁸⁹ *Sydney Gazette*, xxxi., No. 2260, 19th March, 1833; *id.*, xxxi., No. 2270, 11th April, 1833; *id.*, xxxi., No. 2273, 18th April, 1833.

²⁹⁰ *Sydney Gazette*, xxxi., No. 2296, 18th June, 1833.

in 1830; also a letter to the Editor of the same Journal, signed "T. D.," advocating a similar course, appeared in the issue of 1st August, 1833²⁹¹, but nothing seems to have come of it. On leaving Sydney he went to Tasmania, where we hear of him in 1837²⁹².

MR. W. HOLMES (p. 75)—I have been favoured by Mr. William Dixon with the following extract²⁹³ :—

"The public are not generally aware that a beautiful Collection of Australian curiosities, the property of Government, is deposited in the Old Post Office. This Museum is under the Superintendence of Mr. Holmes, who, between the hours of ten and three, politely shows the same to any respectable individuals who may think fit to call. It is well worthy inspection."

This quite bears out Lhotsky's statement as to the custodian of the Colonial Museum.

It is clear from Raymond's "New South Wales Calendar and P.O. Directory" for 1833, 1834, and 1835²⁹⁴, that the position was unoccupied, although in 1833 the sum of £130 was voted as salary.

REV. W. B. CLARKE (p. 76)—His appointment as "Secretary and Curator with Salary" was announced by the Committee to the Colonial Secretary by letter dated 6th July, 1841²⁹⁵. Several amusing stories relating to Clarke's fossil-gathering are related by the Rev. J. S. Hassall in his interesting work²⁹⁶, "In Old Australia."

REV. C. P. N. WILTON (p. 68)—I have a little more information regarding this gentleman. He was Master of the King's Female Orphan Institution at Parramatta in 1827, and one of His Majesty's Chaplains in New South Wales. The publication of his "Australian Magazine, or Quarterly Journal of Theology," etc., almost brought him into serious trouble with the publisher of an already-existing and somewhat similar titled publication, known as the "Australian Magazine," who threatened Wilton with a "writ of injunction"²⁹⁷. His resignation of the Parramatta appointment took place in 1828²⁹⁸.

DR. G. BENNETT (p. 75)—Various titles were assumed during 1838-1841. He severally signed himself as "Secretary," "Secretary and Conservator," "Curator," and "Conservator," only during 1836. He resigned the Secretaryship as from 1st February, 1841²⁹⁹.

²⁹¹ Sydney Gazette, xxxi., No. 2317, 1st August, 1833.

²⁹² Sydney Gazette, xxxv., No. 2908, 7th January, 1837.

²⁹³ Sydney Gazette, 31st August, 1830.

²⁹⁴ Raymond—New South Wales Calendar and Post Office Directory for 1833, p. 249; *Ibid.*, 1834, p. 243; *Ibid.*, 1835, p. 371.

²⁹⁵ Letter-book, i., p. 34.

²⁹⁶ Hassall (Rev. J. S.)—"In Old Australia," 1902, pp. 65, 83, etc.

²⁹⁷ Sydney Gazette, xxv., No. 1383, 8th August, 1827; *Ibid.*, xxv., No. 1398, 12th September, 1827; Barton—Literature of New South Wales, 1866, p. 68.

²⁹⁸ Sydney Gazette, xxvii., No. 1604, 6th January, 1829.

²⁹⁹ Letter-book, i., 1837-61, pp. 1, 12, 13, and 33.

THE NAME "AUSTRALIAN MUSEUM" (pp. 72-3)—It is now clear this name was in use before 1836. Mr. Hugh Wright called my attention to the following. In the "Estimates of the probable Expenditure of the undermentioned Establishments . . . for the year 1835" (dated 12th June, 1834) is the following line:—

"Australian Museum—Towards the support of the Institution . . . £200."

The same appears in the Minutes of the Legislative Council of 4th July, 1834.

ALEXANDER MACDUFF BAXTER (p. 67)—He was appointed Attorney-General previous to May, 1826, arrived in Sydney 31st July, 1827³⁰⁰, and succeeded Saxe Bannister in that office. He is mentioned in Judge J. S. Dowling's "Reminiscences," as taking part in the discussion on 11th June, 1829, on the so-called separation of the Bar into Barristers and Attorneys³⁰¹. He appears to have come under the displeasure of Governor-General Darling who doubted his capacity as a lawyer. He resigned in 1831, and was nominated by charter "Puisné Judge" at Hobart. His differences with Governor Darling were aggravated by domestic troubles. After some delay he returned to New South Wales, and thence to Great Britain, where he died³⁰². As to his endeavour to establish a Museum the following extract from the "Sydney Gazette," 17th September, 1829³⁰³, for which I am again indebted to Mr. William Dixon, is explanatory:—

"The idea started by our respected Attorney-General some twelve months ago, of establishing a Museum in this 'land of contrarieties,' appears to have fallen still-born to the ground. It was a good idea, nevertheless; and we heartily wish the learned gentleman would set about realizing it in right good earnest."

Those who read the first part of these "Fragments" will at once grasp how I arrived at 1827 as the approximate year in which this Museum commenced its career. By a fortunate visit to the Mitchell Library my assistant, Mr. W. W. Thorpe, came across the following copy of a despatch from Earl Bathurst to Governor-General Darling which completely substantiates my date:—

83962-3

*Colonial Office,
N.S.W. Entry Book, 8,
Downing Street,
30 March, 1827.*

BATHURST—R. DARLING, 30-3-27.

Lt.-General Darling,
Etc. Etc. Etc.

No. 16.

Sir,

It having been represented to me that it would be very desirable were the Govern^t. to afford its aid towards the formation of a Publick Museum at New South Wales where it is stated that many rare and curious

³⁰⁰ Howe's "Australian Almanac" for 1829, p. 145.

³⁰¹ "Old Times," i., pt. 2, 1903, p. 120.

³⁰² West—History of Tasmania, i., 1852, p. 162.

³⁰³ Sydney Gazette, xxvii., No. 1711, 17th September, 1829.

specimens of Natural History are to be procured, I do myself the honour to acquaint you that although I feel a difficulty in authorizing the commencement of any Building for that purpose until an Estimate of the expense shall have been first submitted to my consideration, yet I am disposed, in the meantime, to allow a sum, not exceeding £200 per annum, to be disbursed for the purpose of assisting in the accomplishment of this object; and as one of the first steps towards ensuring its success seems to be the sending out some proper person to assist in collecting and arranging such specimens as it may be possible to procure in that quarter, I have been further induced to consent to the appointment of a young man to that particular duty who has been recommended to me as peculiarly fitted for it, and who will, therefore, be immediately sent out to the Colony in the capacity of Zoologist with the same rate of Salary and allowances as appear to have been given to Mr. Fisher, the present intendant of the Botanic Garden at Sydney.

I have, etc.,

Bathurst.

In the preparation of these "Fragments" I have received most cordial assistance from Mr. W. H. Ifould, Principal Librarian, Public Library of New South Wales, Mr. Hugh Wright, Librarian, Mitchell Library, Mr. W. A. Rainbow, Librarian, Australian Museum, and my Assistant, Mr. W. W. Thorpe, whose ever ready help has enabled me to surmount many difficulties.

CORRIGENDA.

Part 1, p. 77, footnote 9, line 3, for 1888, read 1858.

EXPLANATION OF PLATE XLV.

Exhibition of Specimens sent to the "Universal Exhibition for Agriculture and Industrial Products," held in Paris in 1855.

The Plate is reproduced from an old print taken from a daguerreotype by Gow, 348 George Street, and presented by J H Maiden, Esqr., Director Botanic Gardens, Sydney



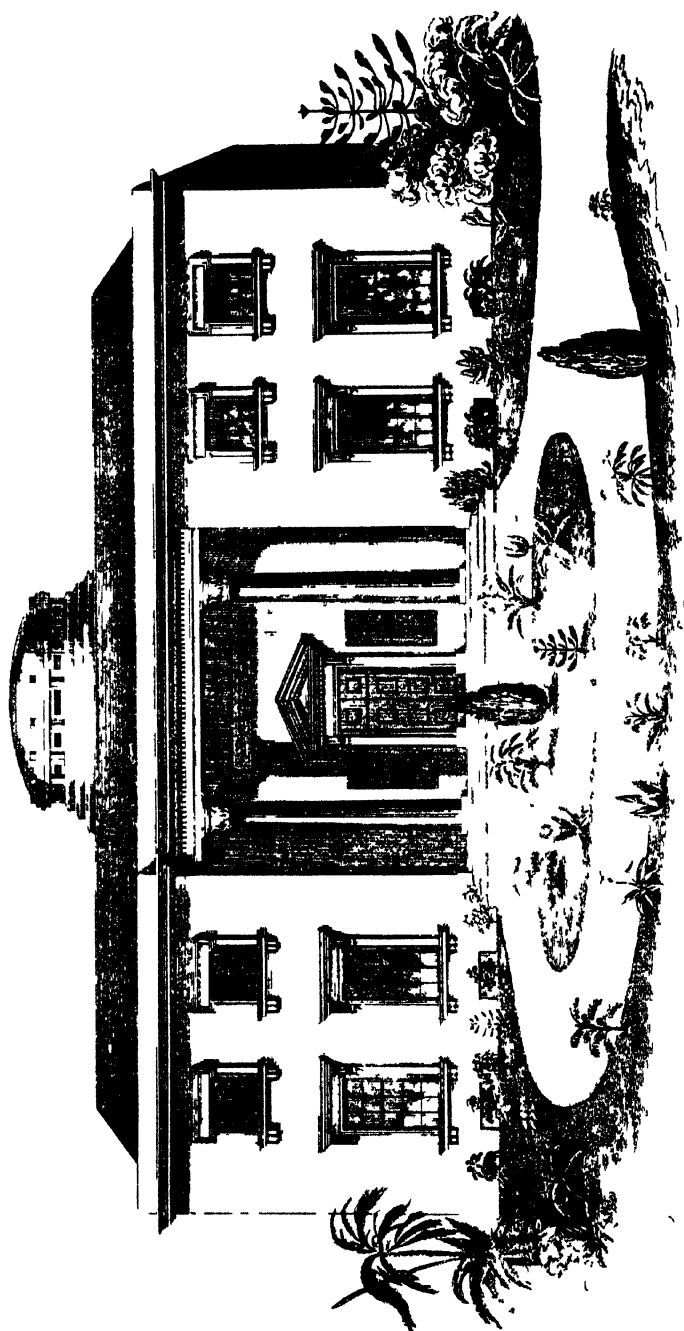
FIRST EXHIBITION HELD AT THE MUSEUM, SYDNEY, N. S. W., 1855.

THE PHOTOGRAPH BY J. H. COOPER, ESQ., OF SYDNEY, N. S. W.

EXPLANATION OF PLATE XLVI.

The North or William Street Wing as represented in Fowles' "Sydney in 1848," 1878, pl opp. p. 83.

This, no doubt, was the original conception of the Colonial Architect (Mr. Mortimer W. Lewis) but it is doubtful if the dome was ever carried out.



EXPLANATION OF PLATE XLVII.

The North or William Street Wing with a portion of the north end of the West Wing. This represents the North Wing as it really was in 1870 and 1880'ties.



H. BARNES, photo, Austr. Mus.

EXPLANATION OF PLATE XLVIII.

The interior of that portion of North Wing devoted to exhibition purposes, after the completion of the gallery and its cases



H. BARNEF, photo., Austr. Mus.

EXPLANATION OF PLATE XLIX.

The West or College Street Wing as it appears when viewed directly in front of the building from Hyde Park.



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